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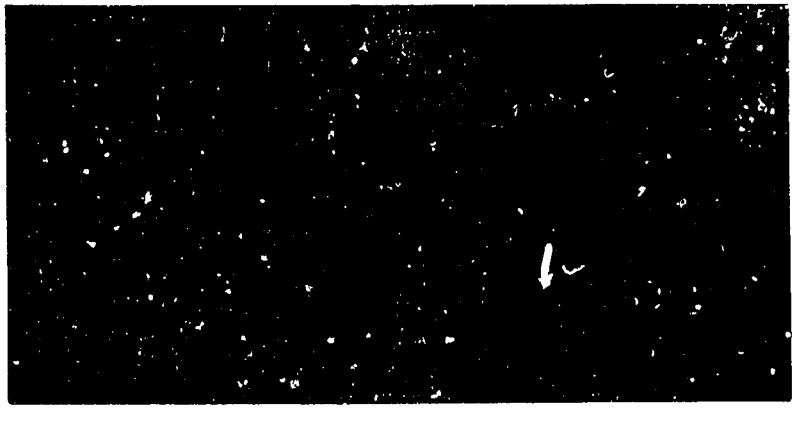

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The Technoenvironmental Dialectics of Herding In Andean Agropastoralism

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July, 1983

RESUMEN

Este informe es parte de una série de publicaciones sobre el agropastoreo en una comunidad andina de indígenas. El presente trabajo trata la organización tecno-ecológica del pastoreo en una economía preindustrial adaptada al complejo ambiente vertical de los Andes. El estudio enfoca el tema mediante la aplicación de un modelo teórico que destaca la naturaleza dialéctica del agropastoreo paleotécnico, y analiza no sólo las interaciones complementarias entre los dos tipos de producción -- agrícola y ganadera -- sino también los conflictos inherentes a su práctica simultánea.

La primera parte del informe describe el ciclo anual de tareas pastorales: ritos de protección y reproducción para los rebaños, la saca y la matanza, la trasquila, el descole, la castración, la cría y los métodos de control genético, padrones estacionales de pacer, y el uso de forrajes suplementarios. La segunda parte considera aspectos no-cíclicos del manejo de animals: la infraestructura y herramientas pastorales; la composición de los rebaños por especie, sexo, y edad; la proporción de las pérdidas de ganado y sus causas; y el control de predadores.

Todos estos aspectos del pastoreo son analizados en un marco dialéctico, y son sistemáticamente comparados con sus equivalentes en otros sistemas de producción pastoral -- más notablemente, con el manejo moderno-comercializado. En esta comparación, las prácticas indígenas a veces parecen relativamente ineficientes y hasta "irracionales." Pero, dada las demandas simultáneas (de obra de mano, de capital, de tierras, y de información técnica) ocasionadas por el cultivo paleotécnico -- además de otros factores tales como la aclimatación de especies extranjeras al ambiente andino, las funciones múltiples del ganado en un sistema "mixto" de auto-subsistencia, y el ideal familiar de autarquía económica -- se ve que el indio aporciona sus escasos recursos en forma "racional," para así lograr el óptimo aprovechamiento de su producción pastoral.

El informe concluye ilustrando más detalladamente los lazos complejos -- tanto negativos como positivos -- que unen la agricultura y la ganadería preindustrial. El objeto es subrayar cómo cambios en uno cualquier de los dos sectores, por mínimos que parezcan, pueden resultar en grandes cambios en el otro. Di allí, se señala también la importancia de estas interrelaciones dialécticas en los proyectos que procuran fomentar el desarrollo rural del pastoreo en comunidades campesinas -- tanto en la región andina como en otras partes del mundo -- donde se practica una adaptación paleotécnica del agropastoreo.

PREFACE

The following is one of a series of reports which are a product of five months of intensive fieldwork in the community of Usi (Peru) during 1980. The research was done by Constance M. McCorkle with the assistance of Lidia Jimenez Zamalloa.

In collecting the data reported here, McCorkle and Jimenez relied on both qualitative and quantitative methods. Formal interviews were conducted with a sample of village residents and then were supplemented by participant observation and informal conversations. Only a small portion of the data collected is reported here. Interested readers may request other reports which discuss other aspects of the investigation.

The study of Usi was carried out as a part of the Title XII Small Ruminant Collaborative Research Support Program under Grant No. AID/DSAN/XII-G-0049 in collaboration with the Instituto Nacional de Investigacion y Promocion Agraria. Additional support was provided by the University of Missouri.

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INTRODUCTION

The Aims of This Report

This report presents a thorough-going[1] description of the technological/ecological organization of herding among Andean peasants. This necessarily lengthy work falls naturally into two parts. The first deals with relatively regular and recurrent pastoral activities: holding protective and reproductive rites for herds; slaughtering; shearing; docking; castrating; breeding; and feeding, including seasonal pasturing patterns and foddering (see Figure 1). The second part treats more general, non-cyclic aspects of animal husbandry: structures and equipment; herd composition, losses and culls; and management of predation.

In addition to describing the basic technology of pastoral production among Andean peasants, this report also seeks to correct the "functionalist fallacy" (Orlove 1980) implicit in many treatments of peasant agropastoralism as a fully integrated, harmonious whole. The study therefore focuses upon the conflicting, as well as the complementary, demands that simultaneous cultivation and herding place upon the autarchical peasant household -- and upon its scarce resources.

The Dialectical Model

Agriculture and pastoralism stand in a dialectical relationship to one another in peasant societies (McCorkle 1983, Vincze 1980). The complementary, or integrative, aspects of the two forms of production have long been recognized by students of agropastoralism. To give but few examples, ecologically, for instance, herding complements cultivation by making otherwise unproductive, non-arable lands productive. Technologically, animals furnish indispensible fertilizer for crops. They also provide power for various agricultural activities, materials for crafting farming and other paraphernalia, and transport for carrying harvests from fields to home or market, and fertilizer to fields. Economically, animals play a crucial role as investment options for storing agricultural surpluses; and, in general, they serve as risk reducers and hedges against crop failure. In return, crop residues and agricultural byproducts furnish rich forages and winter fodders for herds. And fallow fields, which would otherwise lie unproductive for long periods, can be turned to productive use as grazing grounds.

Again, these and still other complementarities are well-known; and certainly, they are important in understanding why peasants pursue herding in the first place. But although they are seldom addressed, conflicts, too, characterize peasant agropastoralism. In large part, these arise from the paleolithic (Wolf 1966), or preindustrial, technology of peasant agriculture. It is essentially non-monetized (e.g. no chemical pesticides or fertilizers), utilizes a simple, non-mechanized tool culture which depends upon human and animal power only, and hence is highly labor intensive. Coupled with peasants'

characteristic shortage and poor quality of arable land, this paleotechnology makes for low agricultural productivity. The consequence may be that, as in the community under study here, peasants are unable to spare the labor and/or the land to plant even a portion of their holdings in forages or hays for animals. Nor may any of their existing grain production be diverted to animal feeds since it is barely adequate to meet human needs.

This inability to produce forages or feeds, plus a lack of capital or labor for extensive fencing, in turn dictates a pastoral technology of rangestock operation. Livestock cannot be stabled, but instead must daily forage for their food on open ranges. Lack of stabling makes many aspects of animal management much more problematic: specialized care for neonates and pregnant animals; disease control; selective breeding; protection from inclement weather, predators, accident, straying; and so forth. Obviously, too, control over diet is greatly diminished. The effects of all these factors are reflected in lowered pastoral productivity.

Moreover, rangestock operation introduces the potential for difficult spatial disjunctions between cultivation and herding by geographically separating the two activities, either seasonally or permanently. These spatial conflicts directly translate into problems of labor recruitment, allocation, and synchronization for the peasant household, which operates under an ideal of productive autarchy. Such problems become all the more acute when, as among most agropastoralists but unlike more nearly "pure" pastoralists in the Andes and elsewhere, households are structured in nuclear families rather than cooperating, virilocally extended units. While labor problems in Andean peasant pastoralism are directly treated in a companion report (McCorkle 1982b) to the present study, they inevitably surface here, too. As we shall see, lack of time/labor precludes peasants from always applying even what pastoral technology and techno-informational resources they do possess.

The difficulties of coordinating agriculture and pastoralism are even further exacerbated within the context of a generalized mountain procurement system (Rhoades and Thompson 1975) in one of the world's most complex ecologies: high altitude tropics. In such systems, in order to survive each family must strive to raise the maximal variety of plant and animal domesticates that can exist within the community's vertical ecology. This subsistence strategy necessarily leads to a very complicated, heavy, and again, often spatially dispersed schedule of both cultivation and herding duties, as well as to techno-informational and other competitions between the two forms of subsistence. In short, coordinating the overseeing of multiple species of rangestock with nuclear household agricultural activities in varying ecozones poses a real challenge to integrating the two sectors of production. This challenge is readily evident in a brief sketch of the field site on which this study is based.

The Field Site

The indigenous community of Usi lies above the Vilcanota River in the District of Quiquijana, Province of Quispicanchis, Department of Cuzco, Peru (see Figure 1). Its population consists of 106 nuclear families totaling some 600 inhabitants. All but roughly 10% of these are monolingual Quechua speakers, and their culture and technology represent the most "traditional" to be found in highland Peru today.[2] An estimated 84% of these nuclear units complement their agriculture with animal husbandry. Of those families who do not possess animals, many are as yet young couples who still aspire to the community ideal of stockraising. Others are families who have lost their stock to epidemics or rustling, and have so far been unable to rebuild their herds. The average household herd is composed of 26.8 ovines, 5.2 camelids (almost exclusively llama), and 1.3 bovines. A few people keep burros and swine as well.

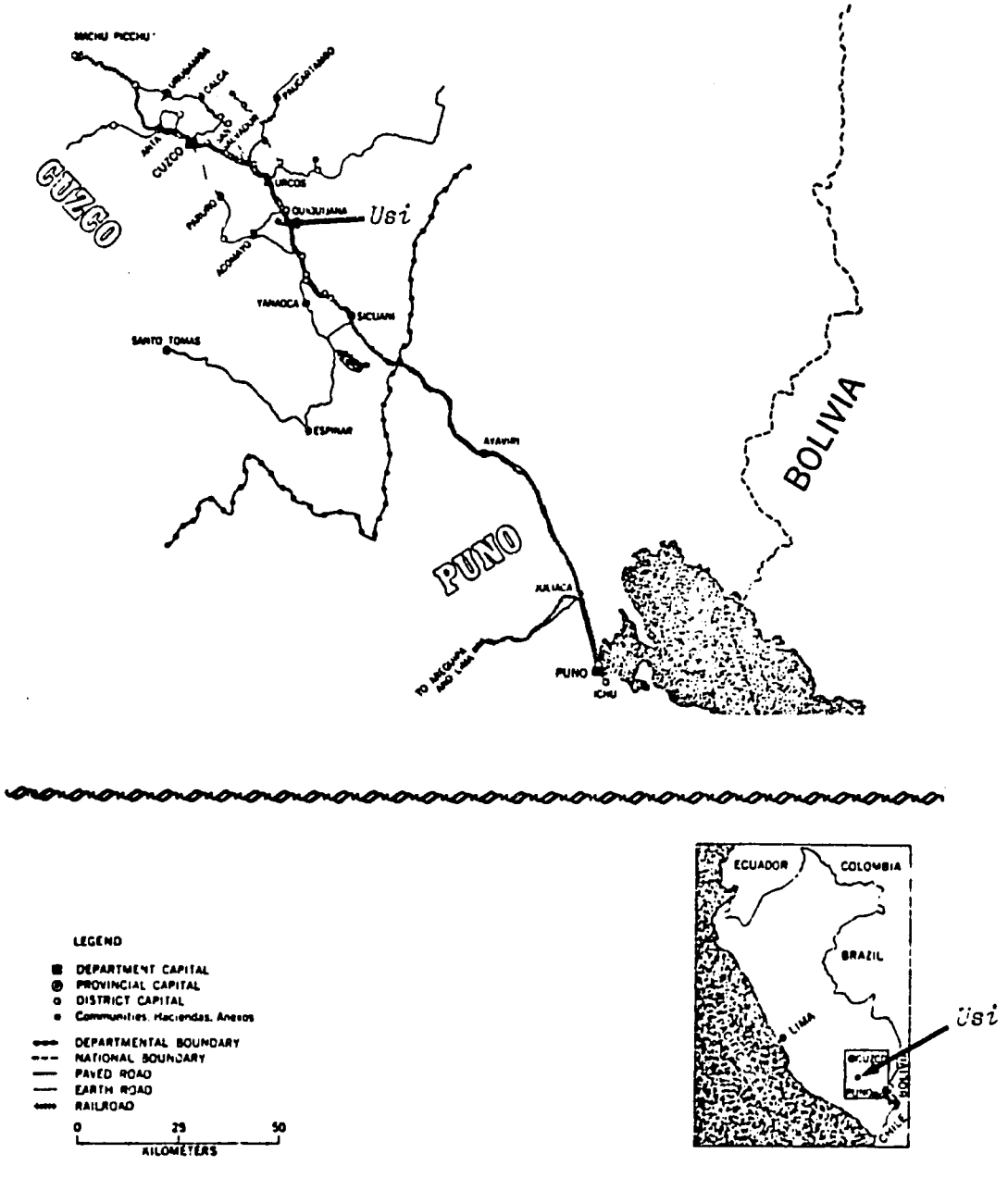
The nucleated settlement of Usi lies at approximately 3,700 meters above sea level, although community lands extend from the river valley floor at about 3,200 m up to rocky scarps as high as 5,000 m (see Figure 2). Given this altitudinal range, Usinos exploit a complex vertical ecology that can be rapidly schematized in three distinct "agrolife zones."

Each manifests a differing constellation of climate, plant and animal crops, land tenure patterns, and what Wolf (1966) terms "peasant ecotypes" and Guillet (1981a) calls "agricultural regimes."

1) The low, or maize, zone: 3,200--3,500 m. The warmest and most fertile area, this zone is primarily devoted to fenced, irrigated, yearly-cropped maize fields, where the oxen-drawn Spanish plow may be seen. Dispersed amongst the maize, the chenopodium quinua is raised. More limited, irrigated cultivation of maway 'early' potatoes is also carried out. And field peas, squashes, wheat, and some ulluku (Ullucus tuberosus) are grown in the maize zone. Additionally, a few fruit trees flourish at this altitude.

   Usinos normally do little grazing in the maize zone except for pasturing a few head of cattle, since this species thrives best at lower altitudes. However, end-of-harvest stubble grazing for all herd animals is practiced --privately in fenced fields and, in the rarer case of large, open areas in the zone, communally. Land usage and agricultural regime in this relatively rich ecological zone predictably (Guillet 1981a) are essentially privatized. I.e. in addition to enjoying the privatized grazing rights just noted, individuals are free to perform any operation on their fields in any sequence and at any time; and they may plant whatever crops they desire.

Figure 1*
Location Map of Usi



*Adapted from van den Berghe and Primov, 1977.

2) The intermediate, or tuber, zone: 3,500--4,000 m. Rainfall cultivation with the traditional Andean footplow, chakitaqlla, is the rule in this area. In contrast to the low zone, cropping and grazing in the intermediate zone are characterized by what Guillet (ibid.) terms communal control with divisible use rights. This form of domain is exercised through the Andean sectorial fallow system. The sectors, and the system itself, are known variously in the literature as laymi, mañay, or -- the term most often used in Usi -- muyuy. In such systems, arable land is divided into named regions which are planted for a series of years and then left fallow for a series of years. Individuals have exclusive rights to plots within each sector, but they may not graze stock, plant, or harvest in any muyuy until a community-wide decision to do so is formally reached in assembly. The crop rotation sequence is also under communal control. (For fuller descriptions of such systems, see e.g. Custred and Orlove 1974 or Mayer and Fonseca 1979.)

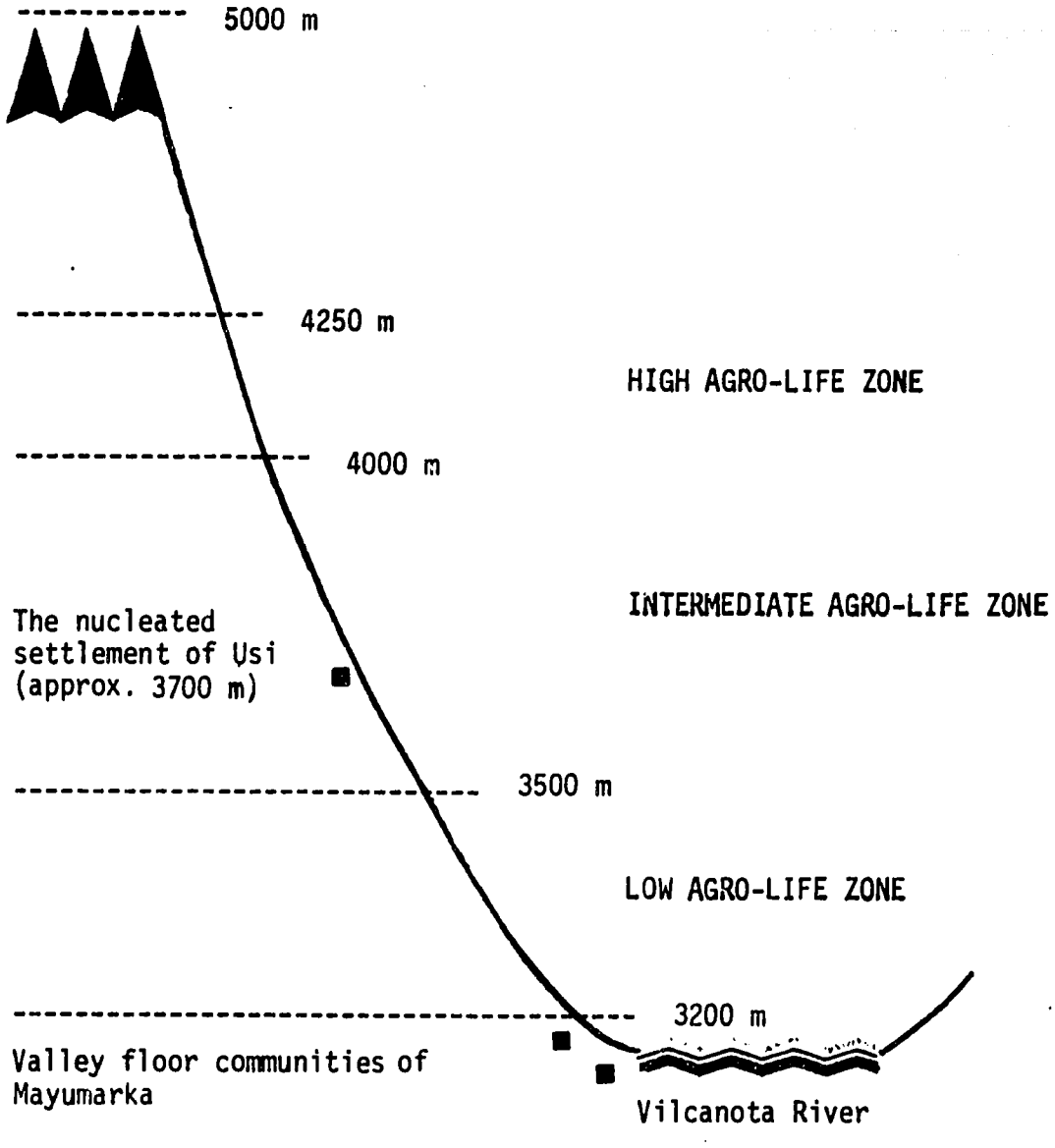
In Usi, there is a dual system of five principal pairs of sectors, plus an additional sub-pair of habas (the broadbean vicia faba) muyuy. One of each muyuy pair lies in each ayllu, flanking the River Usi and following its twisting flow down the q"iswa. Households of both moieties typically own plots in all muyuy of the community.

The five principal sectorial pairs are devoted almost exclusively to potatoes and barley, which together account for roughly 70% of Usi's annual agricultural production. However, a few rows of the Andean tubers uqa (Oxalis tuberosa) and añu (Tropaeolum tuberosum) are also sown in each potato chacra 'plot'. Each of these five muyuy pairs is planted in potatoes for one year, barley the next, and then returned to fallow for three years. The two bean sub-sectors lower down alternate in a one-year cycle of production and fallow. Small patches of ulluku are often planted within a habas plot, and the lupine tarwi is raised around its perimeter. Whenever a sector or sub-sector is freshly harvested or in fallow, it is open to all Usinos as communal pasturage. Sheep are the predominant herd animal in Usi's intermediate zone.

Finally, also in the intermediate zone and attached to house sites in the nucleated settlement are kitchen gardens. There, a variety of vegetables, herbs, and flowers are tended, sometimes along with special early plantings of a few rows of potatoes.

FIGURE 2

THE VERTICAL ECOLOGY OF USI*



*Here I follow Mayer's (1979:35) identification of the three major agro-life zones of the Andes. In Mayer's scheme the low zone can go as low as 3000 m. However, Usi's lands stop at roughly 3200 m, at the banks of the Vilcanota River. Note also that pasturing in Usi continues above Mayer's 4250 m high-zone mark -- up to some 4500 m.

(3) The high, or pasture, zone: 4,000 m and above. Here lie the high, cold punas of the Andes, where the native bunch grasses, ich"u, grow, along with a variety of small grasses and leafy plants which cluster about the base of ich"u. Aide from some cultivation of papa shiri 'bitter potato' at lower reaches of this zone, and of a little barley on the most sheltered slopes, the high zone is given over to year-round pasturage under a system of communal control with indivisible use rights.

Unlike neighboring regions, say villagers, Usi's high zone incorporates no uq"u (Spanish bofedales). These are areas which retain moisture year-round and therefore shelter the more tender, specialized plants of which alpaca are fond. Access to such pasturage is imperative to large-scale alpaca raising. In consequence, only a handful of Usinos keep even a few alpaca. In contrast, llama thrive in the hhigh agrolife zone of Usi. Some stockowners also keep their sheep there year-round. And, the majority of Usinos typically pasture their herds (with the variable exception of cattle) on these natural rangelands during the dry season (see "Pasturing Patterns").

Even from this brief sketch of Usi's vertical ecology, it should be apparent that the agricultural cycle is a very complex one.[3] Villagers must deal with many kinds of fields, plants, seasons, and even differing agricultural implements and techniques. In many cases, the number of crops to be attended to is effectively doubled in that there is both an early and a late or an irrigated and an unirrigated cropping for a given cultigen. Additionally, none of the major crops such as potatoes and maize are grown in a gamut of subspecies. Moreover, the plowing/furrowing/fertilizing/planting/weeding/hoeing/harvesting/threshing/preserving/storing schedule varies for almost every cultigen. And, all these activities are performed with a clearly paleotechnic tool kit. While the Spanish plow drawn by oxen may be seen in parts of the low zone, everywhere else the dominant implements are the traditional Andean footplow and a variety of crude mattocks and hoes. Threshing is generally done manually; potato fields are manured by hand; and so forth.

Furthermore, the demands of cultivation are relatively inflexible. Land must be plowed while still soft from the rains. Ripening crops must be protected from theft and the depredations of animals. Fields must be harvested before frosts come. And, produce must be processed and stored before it spoils. In sum, at no month in the year are Usi's agropastoralists entirely free of the intensive manual labor requirements of paleotechnic agriculture. Meanwhile, however, under rangestock operation animals continue to require daily droving and supervision -- not to mention more intensive, aperiodic pastoral operations such as shearing, curing, castrating, docking, etc.

All these demands are what set the stage for the dialectical interplay between Andean peasants' animal husbandry and their

agriculture. Thus, in addition to describing the basic technology of Usino animal husbandry, each topical section in this report also analyzes how specific management techniques are directly grounded in the agropastoral dialectic as it is expressed in this tropical, mountain ecology. In the process, indigenous techniques (or the lack thereof) are systematically contrasted with their equivalents in other systems of pastoral production -- both Western and, where information is available, Andean pure-pastoralist. As the dialectical model predicts, Usino methods of animal management often appear comparatively inefficient, inept, or even outright irrational. But when the competing demands of paleotechnic agriculture are taken into account (along with the "givens" of ovine alienage in the Andes, and the peasant ideal of household autarchy), village pastoral practices generally find a readily "rational" explanation. This issue of "rationality" and its implications for economic development among peasant agropastoralists form the larger analytic subject of the report's summary remarks.

Methodology

The field methods used to investigate the many different aspects of animal management discussed here were nearly as diverse as the topics themselves. Very broadly, methods embraced: application of an intensive battery of formal questionnaire protocols to a carefully stratified, 30% sample of all village stockowning families; open-ended but topically focused interviewing within the community at large, plus day-long sessions with key informants; casual conversation and general querying; and, of course, participant observation. For particular topics, the foregoing activities might be supplemented by still others, such as creating annotated photo-documentaries, systematically collecting and tagging samples of pastoral products, or examining individual animals. Naturally, too, information collected in the course of lexical, ethnoveterinary, and socio-organizational researches (see publications Nos. 4 and 5 in this series, McCorkle 1982a, b) also figures in many of the issues discussed here.

Needless to say, methods often overlapped. Conversely, even within broad categories of methodology, activities varied greatly. For example, while "participant observation" in shearing meant taking knife in hand, in studying herd compositions it sometimes involved shinnying up corral walls at 5:00 a.m. to "observe" the numbers and species of animals therein. "Open-ended but topically focused interviewing" could take one of two forms. I might successively interview in depth a number of persons particularly knowledgeable on a given subject, e.g. estancia operation or proper t'inka procedures. Alternatively, I might put a series of questions about some more limited aspect of animal management (e.g. docking, castrating) to everyone I encountered during a day's "walkabout" through the village.

Ultimately, all these methods figured in gathering the wealth of data on which each section following is based. However, for any specific subject, usually one or two techniques predominated, while the others served as double-checks and supplemental sources of information. The following chart outlines the principal methodologies utilized. The

check marks indicate the relative importance of each method to each section -- i.e. ✓✓✓ represents a primary source of information while ✓✓ and ✓ record secondary and tertiary sources, respectively. Further detail is provided in the text where appropriate, and in footnotes. An appendix discussing construction of the stratified sample at length and displaying the protocols employed can be obtained by writing directly to the author.

Table 1

Methodologies Utilized

		Household Sociological Questionnaire*	Herd Census: Synchronic*	Herd Census: Diachronic*	Inventory of Animal Structures*	Wool Production Protocol*	In-Depth Interviewing	"Walkabout" Interviewing	Participant Observation	Direct Observation	Lexical Researches	Photo-Documentaries	Collection of Animal Products Samples
T'inka				✓✓			✓✓		✓✓✓	✓✓		✓	
Slaughter							✓✓✓						
Shearing						✓✓✓	✓✓		✓✓✓	✓✓	✓	✓	✓
Docking							✓✓	✓✓✓		✓			
Castrating				✓✓✓			✓	✓✓✓			✓✓		
Breeding							✓✓✓			✓✓	✓		
Feeding	Pasturing Patterns	✓					✓✓✓		✓✓	✓✓			
	Foddering				✓✓✓		✓✓			✓			
Animal Structures and Equipment					✓✓✓		✓✓	✓		✓✓✓			
Herd Composition, Losses, and Culls			✓✓✓	✓✓✓			✓✓			✓			
Predators				✓✓✓			✓✓	✓✓✓		✓			

*Administered to the 30% stratified sample of village stockowners. The reader should also be advised that information gathered with the animal diseases protocol (see Ch. 6 and Appendix) surfaces in almost every section of this chapter.

PART I: THE ANNUAL CYCLE OF ANIMAL MANAGEMENT

Figure 3 outlines the annual round of animal mangement in Usi. While the sequence of events charted is "real," the scheduling depicted here is more general and "idealized." This is necessarily so for two reasons. First, of course, in any given year climatic fluctuations (in the Andes, notably droughts and frosts) directly condition the precise timing of various management operations -- e.g., shearing, foddering, seasonal herd movements. Second, since no "purely" pastoral activity is carried out communally[4] in Usi, individual stockowners have considerable leeway in making management decisions. The timing of a particular operation (e.g. culling, shearing, docking) may vary widely across households. Often as not, scheduling depends upon extra-pastoral factors such as family crises or availability of scarce labor. In consequence, by villagers' own admission, their management timing is sometimes far less than optimal.

Some further comment on Figure 3 is in order. First, in an agropastoral system it is not always easy to classify any one subsistence activity as solely "agricultural" or "pastoral." Hence the inclusion here, too, of tasks such as the collection and preparation of agricultural byproducts for fodders, and llama transport of manure to fields. Second, only the "majority" pasturing pattern is charted. Two other strategies, followed by only a handful of Usinos, are detailed in the text.

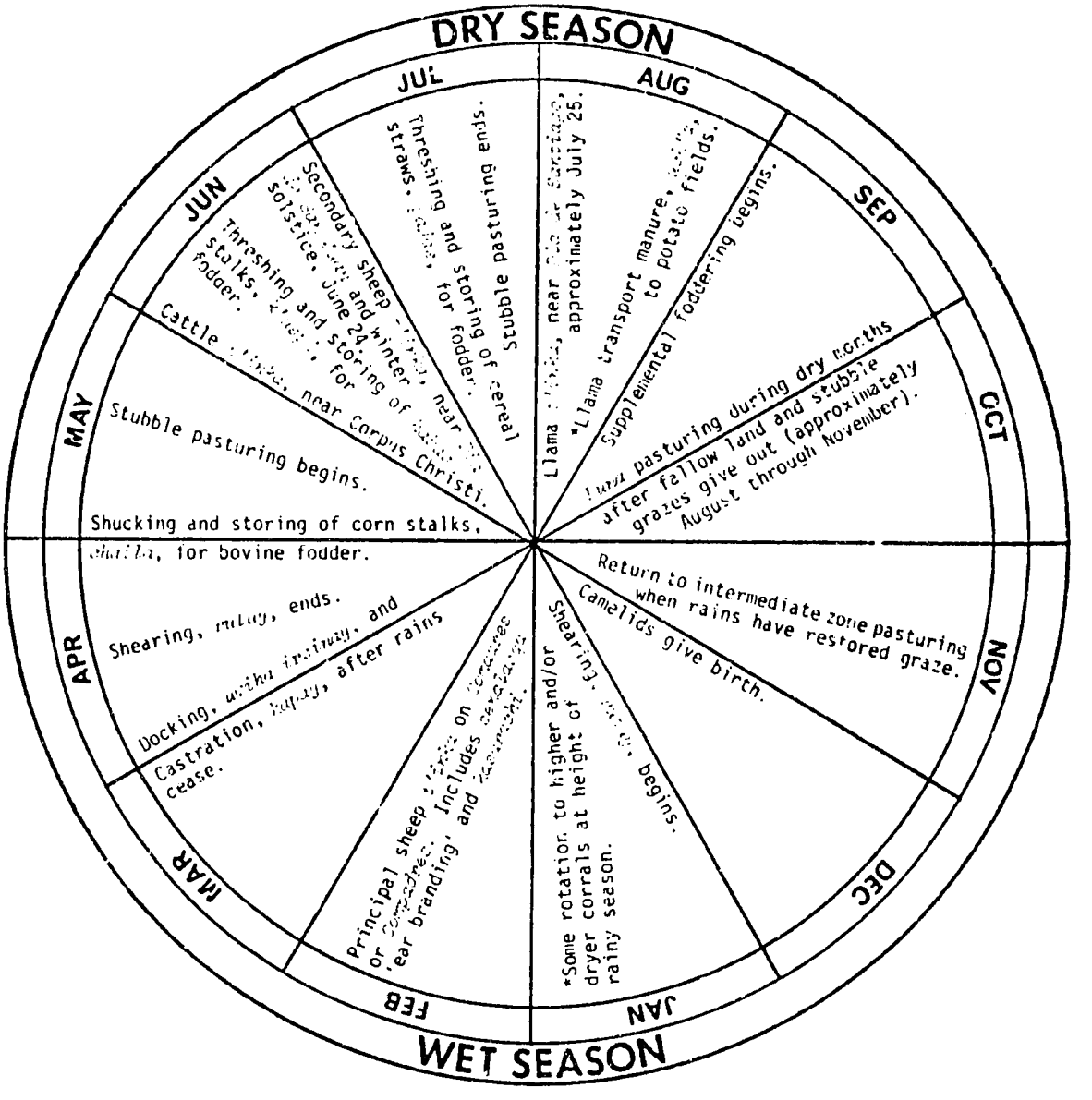
Third, the reader familiar with other systems of pastoral production will remark the visible absence in Figure 3 of a number of basic management operations. To give but a few examples: periodic veterinary prophylaxis; servicing/breeding, lambing, or weaning operations, along with related tasks such as tagging, crutching, or flushing of ewes; and efforts at range maintenance or modification. As we shall see throughout, these lacks are symptomatic of dialectical constraints upon peasant animal husbandry. Finally, and conversely, Figure 3 incorporates certain other "management techniques" that would be just as strikingly absent in descriptions of Western animal science -- supernatural ceremonies for herds. We turn to this aspect of Usino animal management first.

T'inka

T'inka, which may here be loosely glossed as 'offerings', are household-level[5] protective and reproductive rites for herd animals. I open this section with their description primarily for two, emically-derived reasons. First, in the folk view, t'inka initiate the "management year" for each species. Second and relatedly, stockowners consider this supernatural management technique just as important as "natural" ones -- indeed, perhaps even more so. If the gods are not first satisfied through proper propitiation and supplication, then all other, more "mundane" management efforts will avail little in promoting pastoral plenty and well-being across the year.

Figure 3

The Annual Cycle of Agricultural Tasks



NOTES:

There is no human intervention in servicing/breeding, birthing, or weaning--with the exception of cattle (see text).

Only the "majority" pasturing practices are represented in this Figure. For the *estancia* and "mixed" patterns, see text.

In an agropastoral system, it is difficult to classify all activities as purely "agricultural" or "pastoral." Hence the inclusion here of, e.g., manure transport and preparation of agricultural byproducts for fodder.

Single-starred items are discussed in the second half of the chapter.

T'inka are colorful and exotic events featuring such favorite anthropological esoterica as the forced inebriation of camelids[6], and "marriages" of herd-animal couples. In consequence, unlike many other aspects of Andean animal husbandry, t'inka have received considerable attention from researchers. Thorough-going descriptions of these dramatic rituals abound--Aranguren 1975, Flores 1977a, Mayorga et al. 1976, Nachtigall 1975, Tschopik 1951, Valderrama and Escalante 1976, West 1983, and still others. Although nearly all are based on research among "pure" pastoralists, these firsthand accounts largely parallel the verbal descriptions of t'inka I collected among Usi's agropastoralists. Hence I refer the reader to the above sources for the precise details, sequence of events, and full symbolic interpretation of t'inka. Here I limit my remarks to the general form, functions, timing, and "naturalistic" implications of these ceremonies in Usi.

Although pre-Columbian (indeed, pre-Incaic; Nachitgall 1975) in origin, t'inka have been extended by cultural analogy to herd animals other than camelids and have become syncretically keyed to the Catholic calendar.[7] In Usi, three species, all ruminants,[8] receive t'inka: llama and cattle once annually and, in a significant break with indigenous tradition, sheep twice. Summarizing the information presented in Figure 3, the annual village schedule for these ceremonies is as follows.

Sheep — The majority of stockowners hold the principal uwiha t'inka on Comadres, the Thursday preceding Ash Wednesday, i.e. the second Thursday in February. A few families instead opt for Compadres, the first Thursday in February.

The secondary t'inka is the Dia de San Juan, for this personage is considered the patron saint of ovines. Falling on June 24, the day also corresponds to the winter equinox--a major festival in the Incaic ceremonial calendar.

Llama — Usinos hold the llama t'inka in late July or early August (often August 1) close to the Dia de Santiago, (July 25) patron of llama. Saint Ann, another figure linked by local legend to this species, is also celebrated at this time.

Cattle — Cattle received their t'inka at Corpus Christi, around June 1.

(Note, however, that the above schedule is somewhat flexible, if only because throughout the Andes all sacred events -- as well as many secular ones --may never be held on Tuesday or Friday. Further, families sometimes find it expedient to shift their t'inka several days forwards or back due to labor conflicts, notably during harvesttime.)

Again, the principal emic function of t'inka is to enlist the aid of the gods in protecting and multiplying herds across the year. In addition to the Spanish saints mentioned above, ancient Incaic and various local dieties are called upon -- e.g. illapa, the lightning; apu, powerful mountain spirits; important rivers, springs, and lakes. However, the focal deity in all t'inka is the Pachamama 'earth mother'. As one informant explains, it is she who is responsible for herd fertility. She also expressly aids in protecting animals from predators, serious falls, and lightning, and in making pastures grow lush and rich. Sadly, though, Usinos say she can do little to save their herds from disease. (This is understandable in view of Usino etiologies which are largely wind-, water-, and heat- (sun) related. The Pachamama has little control over these realms. See McCorkle 1982a.)

Because of this foucus on the Pachamama, certain ritual events characterize all t'inka. A day beforehand, the elaborate fetish bundle (despacho) to be burned in payment to the earth must be carefully prepared. I personally participated in and documented in notes and on film the entire process for Usi's two principal herd animals, since the contents and procedures vary for each species.[9] A particularly important aspect of despacho preparation is calling out the multitudinous toponyms of Usi's grazing lands as a triad of painstakingly selected "holy" cocoa leaves (K'intu) is placed in the bundle for each locale, along with two grains of corn and a bit of untu, llama heart-fat. This naming procedure both reminds and bind the Pachamama to exercise her protective powers at each of these "parts of her body," as it were. If an incorrect number of seeds or leaves are included, or if any area goes unmentioned, a household animal will assuredly meet with harm there are some point during the year.[10] Once completed, the despacho is carried by dark of night to one of the sacred spots high in the punas where these burnt offerings (haywayku or pago) are made. Features of the flame and smoke prognosticate the upcoming year's success in pastoralism. Only males may make these offerings.

Festivities begin the following morning and usually last far into the night. Activities include feasting on special dishes, dancing, and much ritual drinking in which the Pachamama, too, participates, through libations poured upon the ground. Friends, neighbors, and relatives drop by to help the houshold and its invited guests celebrate. At some point early in the day, all present take a turn in the ch'uyay -- a rite of purification and consecration in which the corraled animals are baptized with wine, trago, or chicha, and are urged in incantations to be fruitful and multiply.

Also figuring in the day's events is ceremonial opening of the señalu q'ipi, which has been carefully stored away since the last t'inka. A sacred bundle of ritual paraphernalia, the señalu q'ipi's principal contents are inqa (also known in Usi as illa) -- stone effigies of sheep, llama, and cattle. The appropriate inqa are placed in a corner of the species' corral, where they undergo ch'uyay, receive offerings and prayers, and so forth. Without going into great detail (cf. Flores 1977a), I note only that these effigies are bound up with

notions of an individual's "luck" in pastoralism. If properly propitiated, they, too, aid in multiplying and protecting herds.

In addition to the foregoing, shared activities, each species' t'inka is distinguished by other, specialized events. The cattle ceremony, for example, includes decorating the creatures' horns with crowns of fruit and flowers and building a great bonfire in the corral. As noted earlier, llama t'inka feature forced inebriation of every animal in the herd. Each is also ritualistically painted with taku, a bright red ferrous oxide powder. Then the drunken animals are left to fast all day in the corral. Males and castrates further undergo t'ikachasqa -- "earringing" with gaily colored yarns -- "so they will be strong for their transport work."

The principal t'inka for sheep is highlighted by two special activities -- the kasarachi and the señalasqa. As its name implies, the former comprises a "marriage" of the healthiest young ram and ewe in the flock. The couple is crowned with flowers, painted with taku, and then caused to stand on hind legs and embrace. The "wedding" is followed by their señalasqa, or ear-branding. The newlyweds are then showered with flowers and driven out to pasture while celebrants follow behind rejoicing and scattering petals upon the path. Afterwards, the takusqa 'flower-throwing' and, for animals not branded in previous years, the señalasqa are repeated with the rest of the flock, taken two by two. Finally, all the sheep are led out together, again amidst flowers and gaiety, to join the ovine bride and groom, while humans return home to feast, drink, and dance away the rest of the day and night.

The uwiha t'inka in February is further distinguished from other species' in that, ideally, it calls for sacrificing a sheep. When queried as to whether cattle or llama should be sacrified at their annual t'inka, villagers pragmatically point out that these species are far too costly and too few for such ritual luxuries. (However, with equal pragmatism they observe that if a llama is very aged and/or infirm, it might as well be culled for the t'inka as allowed to die a natural death. And, in fact, households with sizeable herds of llama occasionally do make such sacrifices.) Theoretically, sacrificial sheep should be rams in the prime of life, spotlessly white and untainted by disease--so that their spirits will return to create more such paragons (see "Slaugther"). In fact, however, few sacrificial animals meet these standards but rather are aged, stippled, or ill. Often, therefore, their flesh must be served boiled rather than in the ritually prescribed roasted form, kankachu. Moreover, many pastorally poor households cannot afford to sacrifice any sort of sheep at all. (See discussion of losses and culls.) Instead, as for the waka or llama t'inka, they slaugther guinea pigs. But all informants agree that proper sacrifice greatly enhances the t'inka's efficacy. Households therefore strive to meet the ritual requirements as best they can. The sacrifice itself reportedly involves no out-of-the-ordinary ceremony.

A ritually stipulated kill at this time of the year is likely no accident. Indeed, it makes good adaptive sense. First, it provides a

significant amount of animal protein at a time when work loads are especially heavy. Second, by February, family storehouses are beginning to empty of the crops harvested as much as nine months ago. Meat provides a timely supplement to dwindling vegetable reserves. Not all the flesh of sacrificial animals is always consumed immediately. Up to half may be jerked and eaten bit by bit across the following weeks. Third, after months of the dry season's intense cold and poor pasturage, inevitably some animals are close to death's door. It is only sensible to cull them before they waste away entirely. Finally and relatedly, it is significant that the two other predilect dates for ritual slaugther of sheep in Usi (Cruz Velakuy in May, and Holy Week in April) also fall in these lean months just before harvest time. By that time vegetable foodstocks are nearly (or even completely) exhausted, and people are engaged in the backbreaking work of barbecho 'footplowing.'

A final, occasional feature of uwiha t'inka not shared by other species' is ñawinchasqa (Although its root is nawi 'eye', I am uncertain how to gloss this term.) This consists of the formal presentation of a healthy young sheep to one of the t'inka guests. (As with sacrifices, llama and cattle are too valuable to part with in this manner.) This munificent gesture may be made during either of the two annual ovine ceremonies, but is more common at the principal one in February.

Ñawinchasqa may take place as follows. After all formal ritual activities have been attended to, celebrants spend the remainder of the day carousing at home. As the drinking progresses, in a burst of beneficence the host may decide to endow one of the guests with a sheep. Of course, he must consult his wife before making the decision public, for the flock of a couple long married is truly "joint property." At any rate, after approving this decision with his wife, the host announces his intention and proceeds to select the gift animal on the spot. It must be a healthy young animal, either ram or ewe. The creature is then marked by "earringing" it with yarn through one ear. (This is the only time sheep are thus ornamented in a fashion otherwise reserved to male camelids.) Thereafter, festivities continue. The lucky recipient returns to claim his gift within a few days to a month -- but never, of course, on Tuesday or Friday. He must bring along a t'inka (in this context, considerable liquor) for the ritual drinking bout with the host family which concludes the exchange.

Typically, ñawinchasqa recipients are members of households engaged in longstanding pastoral associations with the benefactor family. Often the gift is made to a child who regularly pastures for the host. In such cases, the animal usually remains in the original owner's flock. Parents, too, may endow their young sheperd/ess with a sheep at t'inka. A number of motives may stimulate ñawinchasqa. It communicates an extra "thank you" for herding services, and thus acts as a positive reinforcement to continued, conscientious labors. Relatedly, there is the distinct and very pragmatic feeling that people who "own stock" in the flocks they oversee are likely to take their duties more seriously. Further, in the case of young herders,

informants say the youngsters can thus begin building up a flock of their own for the future.

In short, while villagers may conceptualize ñawinchasqa as, in one man's words, a puro regalo, such prestations are not entirely disinterested. Certainly, they signal and enhance general social solidarity and goodwill among both kin and non-kin, binding people more closely together through the medium of animals. But they serve definite economic ends as well.

Finally, now, some comment is necessary on the curious fact of ovines' two, to other species' one, t'inka -- the first report of its kind in the literature. It is certainly no accident that sheep are the species at issue. The alien ovine is in general poorly adapted to the harsh Andean environment, in sharp contrast to the indigenous camelids. And unlike that other alien but most valuable of all ruminants, cattle, sheep are not compensated with such pastoral luxuries as the lushest low-altitude pasturage, hoarded high-protein fodder throughout the dry season, and generally more meticulous care year round.

In consequence, sheep suffer the highest mortality rates of all herd animals in Usi. As smaller, weaker creatures lacking any natural defense but mindless allelomimetic flight, they are subject to far greater predation. (Compare the diachronic herd census figures of 34% ovine versus 0% camelid losses to predators for the year sampled!) Their small size works against them in run-ins with their larger herdmates, as well. Also, less sure-footed than camelids, and fonder of leaping about than either camelids or cattle, sheep more often suffer fatal falls. And, they seem to succumb to diseases in the Andes more readily than other herd animals. Besides high mortality, criollo sheep also evidence depressed fertility. Coupled with the rigors of peasant management techniques, Andean environmental conditions (e.g. the intense cold, inadequate nutrition, and high altitude) lead to large numbers of abortions and neonate deaths, fewer conceptions, grossly delayed sexual maturation, failure to twin, and so forth.

It is equally significant that the phenomenon of dual ovine t'inka first surfaces among agro- rather than pure pastoralists. Indeed, many of the latter reportedly make do with a single annual ceremony embracing all herd species (e.g. Allpanchis Phuturinga 1971, Flores 1977c). Usi's agropastoralists, however, apparently require more supernatural assistance across the board in their animal, and particularly ovine, husbandry. Why? The factors cited in the preceding paragraphs are necessary but not sufficient to answer this simple question. Otherwise, Andean pure pastoralists, too, would be expected to hold extra t'inka for sheep.

Rather, we must look further -- to the dialectical model. Quite simply, the competing demands of agriculture, coupled with a nuclear family structure, mean that Usinos are unable to invest as many "naturalistic" resources in animal husbandary as their pure-pastoralist counterparts. "Resources" comprise not only labor, capital, and materials, but also knowledge -- storage and transmission of technical information. Throughout this and other reports in the series, there

are hints that Usinos control less, or less accurate, knowledge of animal management than pure pastoralists. Moreover, given inherent conflicts with cultivation, Usinos are even unable consistently to apply much of the information they do possess. Village herds suffer accordingly, especially the maladapted ovine. Stockowners respond by marshalling additional "supernaturalistic resources," again especially for ovines. In sum, it is small wonder that sheep receive two t'inka in Usi. Essentially, they require at least double the ritual protection of other village ruminants, plus added supernatural encouragement to reproduce.

To conclude, t'inka constitute an important, ideological, aspect of animal husbandry in the Andes. They help people cope, cognitively at least, with pastoral needs and problems lying beyond the control of extant technological, sociological, and other resources. This is not a small matter in the Andean context -- where Indians' access to technological and informational inputs from modern animal science is wretchedly limited, and their access to economic and sociopolitical power even more so; where stockowners are dealing with alien and ill-adapted species; where the region's devastatingly regular droughts, accelerating cycles of sweeping livestock epidemics, or even a single rampaging puma, can decimate family holdings overnight; and where, for peasant agropastoralists, dialectical conflicts with agriculture forestall sometimes even the most basic management action in pastoralism.

Besides assuaging cognitive dissonance, however, this supernaturalistic technique supplements naturalistic resources in more concrete ways. For example, Flores (1977a), following the lead of Custred (1973b), argues that t'inka encode and transmit valuable herding information in their symbology, ceremonial acts and incantations, ritual paraphernalia, and so forth As such, they serve both "library" and instructional functions. Further, as we have seen here, t'inka provide a forum not only for expressing general social solidarity but also, through such events as nawinchasqa, for strengthening or perhaps even creating new socio-organizational resources in pastoralism.

Slaughter

Figure 3 reveals there is no one major slaugther period in Usi's management calendar. This stands in contrast to large stock operations, whether Western commercial or indigenous pure-pastoral, where production is geared to seasonal sale or exchange in quantity. Whereas Andean pure pastoralists typically perform a major saca 'culling' at the beginning of the dry season, Usinos cull only sparingly and aperiodically, as herd exigencies (e.g. disease, injury) or immediate household needs (both economic and social/cultural) for cash or meat dictate. However, as one of the most basic aspects of animal management, slaughter techniques merit at least brief mention, along with associated beliefs and practices.

In Usi, the method of slaugther for all ruminants is the Spanish degüello, or throat-slitting. The pre-Columbian ch'illa is not

practiced, although many villagers have heard of or even witnessed it -- at regional fairs where pure pastoralists come to barter, or in years past when llama caravaners still visited Usi to trade. (In ch'illa, one reaches a hand into the thoracic cavity through a small incision in the camelid's right breast and rips the ascending aorta from the heart. The entire procedure requires an average of only thirty seconds and no blood is spilt. The ch'illa was traditional for both practical and ritual reasons; cf. Miller 1977.)

West (1981) reports that at maturity (4+ years) criollo rams yield an average of 25 pounds of dressed meat and ewes 20, while male llama dress out at 50 to 70 pounds and females at 40 to 50. When an animal is slaughtered for home consumption, everthing is eaten by humans. Dogs receive only the blood and some diseased portions. When a sheep is slaugthered for sale, the comerciante carries off everything --head, hooves, innards, and hide, with the wool unshorn -- leaving behind only the blood and the "baa."

Slaughtering is never done on Tuesdays or Fridays, lest the remainder of the herd follow their companion into death. The deed is always performed at home, usually in the family courtyard, and always out of sight of the victim's fellows. Otherwise, say Usinos, the animals will become frightened and upset, and begin to ask themselves, "Thus will they also kill me?" Informants add that this way, too, "They will not suffer the loss of their companion so much." The victim is unceremoniously trussed up, thrown to the ground, and its throat slashed with a knife. The first blood to spurt forth is sprinkled about the courtyard in offering to the Pachamama. This procedure is accompanied by incantations instructing the animal's 'soul' alma to return and reproduce.

The belief that herd animal souls return to the general vicinity of slaugther is widespread in the Andes (Jorge Flores, pers. com.). Indians consider this supernatural event promotes continued herd reproductivity. Hence, Usinos refuse to sell livestock "on the hoof" outside the community. The soul of an animal thus "sold off" would be lost forever to the village. Worse still, the spirits of its herdmates might decide to accompany it, leaving their bodies "back home" to die. In any event, though, outsiders do not seek replacement or breeding stock from among Usi's sickly and scrawny herds. And commercial buyers slaugther their purchases "on the spot" in the seller's courtyard. This is done not only because the latter desires it, but also because the buyer wishes to avoid the shrinkage of trailing animals elsewhere to slaughter, to bypass abbatoir taxes and inspections, and to render his illegal dealings in meat less visible.

In contrast to reports for other Andean communities, in Usi, slaughtering is the same for both sacred and profane kills. According to informants, it calls for no ceremony other than that noted above. I had no opportunity to witness subsequent butchering techniques, but informants state that these, too, are the same for all ruminants and all occasions. (Cf. Miller 1977 for descriptions of camelid butchering, and slaugther, in nearby regions of southern Peru.) Villagers note only that special care must be taken in butchering a

llama not to shatter the mandible, lest the rest of the herd die. Instead, the jawbone is carefully cleaned, dried, and hung upon the wall of the house to attract good fortune to those living within.

Shearing - Rutuy

Not only to the Western eye but also by villagers' own admission, shearing technology, skills, yields, and de facto schedules are all less than ideal in Usi. Directly or indirectly they suffer the effects of the agropastoral dialectic. Looking first at the timing of shearing and re-exmaining Figure 2, we see that Usinos say shearing should be done in January, towards the beginning of the warm rainy season. The greater availability of forage at this time promotes rapid coat regrowth; heavy cloud cover protects bared flesh from the blistering high-altitude sun; and risk of exposure to frosts and cold is less (after Orlove 1977a).

However, few Usinos manage to shear at this time because of intense conflicts with agriculture. The entire adult male population spends most of the rainy season at the exhausting work of barbecho 'foot plowing'. This must be completed while the ground is still softened by the rains (until early or mid-April) and before harvest time (May). Since barbecho is performed with ayni (reciprocal household labor), women, too, are extra busy. They must prepare huge meals and urns of chicha (native beer), and transport it all to the work parties in the fields. Children are naturally enlisted to assist in these tasks. Besides barbecho, hoeing and weeding of various crops and harvesting of others must be attended to throughout the rainy season. Exacerbating these agricultural demands is the fact that some of the household's youngest and strongest menfolk may be away doing temporary wage labor during much or all of this period.

The net result is that many people put off shearing until well beyond January, and their livestock suffer accordingly. Indeed, I noted something of a general last-minute rush in April--when barbecho is over and family labor forces are swelled by absentees returning for the massive harvest work ahead. In any event, all shearing must be completed before May or, in the terse words of one stockowner, "It is too late."

Usinos share with many Andean pure pastoralists the rule of shearing an animal only once every two years. In Usi, however, this rule is hard to follow. It is not uncommon for sheep to go three years between shearings, and a llama three to four (or even six to ten for a rather q'ara 'bald' llama). Such lapses may be a function of labor shortages, for if there is too little labor to shear an animal before May, it must remain unshorn throughout the frosty dry season. More often, however, the lapse is due to insufficient wool growth across the two years.

Also because of their herd's retarded wool growth, Usinos are forced to delay the age of first shearing. The vast majority of villagers do not clip either sheep or camelids until age three or four. (On the wool production protocol, 77% of the sample responded with this

figure for sheep, and 74% for camelids.) In contrast, the herds of pure pastoralists can be sheared at two years of age (West 1981) or even one (Thomas 1973:134).

Finally, shearing yields in Usi are low, even for the criollo breed. As computed from the aggregate village data reported in the interview protocols on wool production and consumption, sheep average only 2.5 pounds of fiber per animal; llama average 3.6. Compare these figures with West's (1981) report of nearly 4 pounds for sheep of Puneno pure pastoralists and Browman's (1974) average of 5.5 pounds for llama, both at two-year shearings. By way of further comparison, in Western commercial wool operations, yields average 10 pounds of unwashed fiber per sheep (Ensminger 1970:634), i.e. a biennial harvest of 20 pounds as versus the Andean criollo's 2.5 to 4.0.

Usinos attribute their herds' (and particularly ovines') poor fiber production to two major factors. First, they correctly cite poor nutrition in the form of the overgrazed pastures "down below here," i.e. in the intermediate agro-life zone close to the nucleated settlement. Yet because of spatial conflicts with agriculture, Usi's agropastoralists cannot fully exploit the richer forages of the community's abundant punas -- the staple of Andean pure pastoralists' herds. Second but equally important in villagers' view are the intermediate zone's numerous stands of thorn, which people say tear off great hunks of wool. To hear stockowners' grumblings, one would think more than double their actual annual fiber production is hanging on bushes round about the countryside! Interestingly, though, no informant links ovine wool loss to manges (see publication No. 4). Villagers blame only the thorns.

As to the shearing task itself, I was fortunate enough to witness, photograph, document in detail, and even try my hand at shearing one of each species, llama and sheep. I describe these events below. First, however, a number of observations apply to both. Equipment is crude: dull iron knives or scraps of tin can, both requiring repeated sharpenings while shearing even a single animal. Indeed, honing absorbs roughly a quarter of the entire task time. And in the hands of the less skilled, these dull tools make for more wounds and a ragged barbering which leaves a good deal of the fleece unharvested. But Usinos cannot afford clippers or even cheap scissors. Nor do they purchase medicaments for shearing wounds. Gashes are treated, if at all, with a homemade herb bath.

No preliminary pagos, fiestas, or "generally joyful atmosphere" (Flores 1979:93) surround rutuchi of either species in Usi, as reported for camelid shearing among Andean pure pastoralists. Instead, the task is viewed as entirely mundane (either men or women may perform it) and is often done on a "catch as catch can" basis across the rainy season. A few animals may be sheared one day, others another, according to the availability of labor.

Shearing is a household-level responsibility. People do not aggregate herds and organize the task cooperatively. However, families that are labor-poor or that do not command enough shearing skill within

their ranks require extra-household assistance. Help may be sought on an informal basis from relatives, neighbors, or even outsiders who chance to be visiting. Alternatively, a comunero skilled at rutuy may be formally contracted, particularly for larger flocks (25+). Not everyone claims to know how to shear. Nor do most people who say they do know how claim to be expert -- as the number of walking wounded in the village attests. But, while there are no shearing specialists per se in Usi, some individuals are noticeably more adept than others. When help is contracted formally, they are naturally chosen. Payment is usually made with a portion of the clip.

We turn now to the actual sequences, techniques, and mechanics of shearing, with an example for each species.

Llama Rutuy

The procedure begins with sweeping a large circular area of the corral clear of dung. The next chore is to catch the llama, throw it to the ground, and firmly tie its legs. (Even within the confines of a corral, this is not so easy as it sounds, for llama are quick and powerful beasts given to kicking and spitting furiously.) The bound animal should be resting on its right side but, in contrast to reports from other areas, it need not be facing in any special direction.

Two adults are required for the shearing itself, while a third person (in this case, an eight-year-old girl) holds the unhappy animal's head. Usinos say that with any fewer people, llama shearing is impractical. It takes too long and the beast becomes restive and too hard to hold. Even with two men working nonstop, the task requires 40 minutes. With the same labor force, sheep shearing takes only half the time.

The camelid pelt does not come off in a single fleece, but rather in handful-sized tufts which are sorted by color into piles on the dirt floor of the corral as shearing proceeds. The shearer grasps a tuft in one hand, tugs it taut to one side, and cuts with a downward or even vertical motion with the other hand. This is a very simple technique but one which obviously benefits from practice. In an effort at participant observation, I was unable to duplicate the stroke quite so smoothly and rapidly, although I at least managed to avoid cutting into the flesh.

The sequence of llama rutuy in Usi contrasts rather sharply with that described for alpaca in Paratia, where "shearing should begin at the head, continue along the neck, and finish with the extremities" (Flores 1979:94). Instead, Usinos commence on the upper left thighs, with one man assigned the foreleg and another the "aft" (see Figure 4). Shearing then continues from the top of the belly upwards towards the spine.

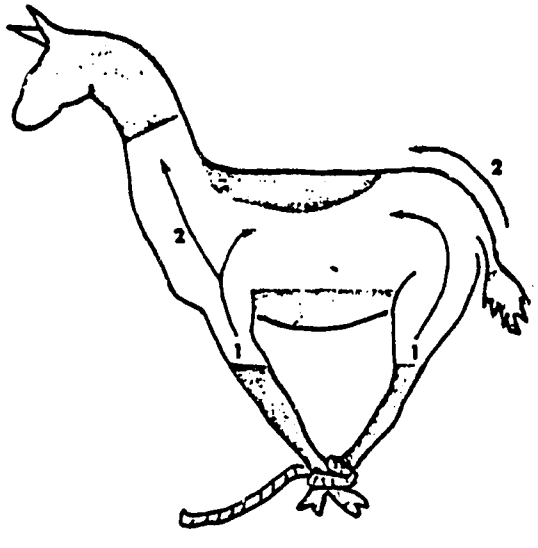
The belly itself is left untouched for the fiber there is very k"ullu 'short' and uywey 'rough' or 'hair-like.' It is therefore extremely difficult to spin and unfit even for plaited or twisted goods. Above a certain level, the neck fiber, too, is not clipped as it is considered too thin and short to bother with. A goodly-sized "pompom" is always left at the tail tip so the llama can ward off the tankallu flies that often plague it. Finally, on carga llama the shoulder wool is also spared, to provide a cushion for heavy burdens.

When the left side of the llama is satisfactorily sheared, the animal is unceremoniously flipped over and the same procedure repeated. The final result, with irregular patches and wisps of wool left here and there on the hide, looks like the work of a mad barber. The shearers averred that all the fiber taken from this animal was of equal quality, whether from the back, butt, tail, thigh, or chest. The total yield in this instance of a hatun ('large' or 'true' llama, as vs. the alpaca-llama crossbreed, taqsa), but somewhat q'ara 'bald', llama was a mere 2 pounds -- just enough to make one rope but nothing more.

While the above description details the general techniques of llama rutuy, this particular case raises several other, interesting points. The owner was a fairly competent shearer, but his household includes only himself, his elderly wife, and their young ward, the eight-year-old girl. In consequence he was forced to seek extra-household assistance. After an hour-and-a-half's searching and pleading, he managed to recruit a reluctant neighbor. In exchange for the latter's aid, the owner made him a small gift of fiber, in an amount "according to the heart." This small outlay was nevertheless significant relative to a clip of only 2 pounds. Again, the yield was so poor because the llama was rather q'ara 'bald'. The animal was last sheared some seven to ten years ago, and the owner states he does not plan to clip it again in its lifetime. Although the fiber is of good quality, he says it is "too little to bother with."

Now, this seems a surprising statement in a village where wool is in extremely short supply. Usinos do not market any of their fiber production (except for a bit of alpaca.) They consume it all themselves. Even so, they bitterly complain it is not nearly enough to meet basic clothing and equipment needs. They are therefore forced to purchase additional supplies from neighboring pure pastoralists. In view of this situation, the owner's decision not to shear his llama

Figure 4
Sequence of Llama Shearing



again appears somewhat less than "economically rational." Offhand, it would seem that 2 pounds of fiber is better than none at all. . .

If we assume that peasants are economically rational, then we must seek some futher explanation of this man's laconic "Not worth the bother. The answer lies in the household-level organization of production. As noted earlier, Usinos do not follow the more efficient practice of aggregating herds and shearing cooperatively. For a family with an incomplete labor force (and in this instance, too, a hefty herd of 18 camelids), shearing less productive animals is apparently too costly -- in time lost both in seeking assistance and in the shearing itself, and in the formal and goodwill payments for assistance, plus other implicit social or labor obligations incurred thereby. In sum, coupled with the tremendous labor demands of other subsistence activities, the strains on nuclear family labor and material/social resources may even prevent some stockowners from reaping all of the slim wool harvests their animals do produce!

Uwiha Rutuy

Sheep shearing is less complex than llama rutuy, but Usinos manage to break all the rules of "good shearing" set forth by Western authorities that would apply to the village situation. Following Ensminger (1970:629), these rules include:

- Shear in a clean place, and keep the shearing floor clean and dry.
- Handle sheep carefully and without injury.
- Avoid "second cuts."
- Keep the fleece unbroken -- in one piece.
- Keep fleece free from stray, manure, and other extraneous matter.

In the shearing I witnessed, no effort was made to clear a space in the corral. The sheep was simply slung onto its side in the mud, and casually trussed up. Informants snorted at the idea that it mattered which side it landed on.

Two workers, male or female, are preferred for sheep shearing. However, one alone is also said to be adequate to the task, although the time naturally doubles. In this instance, the owner and a visiting friend -- neither of them particularly expert -- performed the operation. One employed the lid of a tin can, the other a knife. As usual, a quarter of the worktime was taken up with periodic honings. Total shearing time was 20 minutes, with an additional five spent

collecting loose tufts of wool from the corral floor and rolling them up with the fleece.

Rutuchi commences at the belly where hair leaves off and wool begins. Each shearer begins at one end of the animal and works upwards towards the spine, removing the thigh wool as well. Usinos clip neither the head nor tail since their criollo breed has appreciable wool in either area.

When the sheep is half sheared, like the llama it is unceremoniously flipped over. Unlike the llama, however, shearing then continues from the spine, since of course no wool need be left to cushion burdens. The fiber of the back and, in particular, the sides is considered the finest. That of the neck, thighs, and britch is markedly inferior, although the neck fiber is reportedly easiest to cut.

The shearers were not entirely successful in removing the fleece intact. Some sizeable hunks were detached in the course of their labors. These were wadded in with the rest of the fleece when it was rolled and tied, along with all the clinging burrs, bits of manure, and etc.

In general, these men's efforts were typically inexpert. Tufts of wool were left standing despite second cuts; an entire section of the neck was overlooked; and one fellow gashed the sheep with a misdirected stroke of the knife. The poor creature was left a blotchy orange from the rusty tools. Discounting visible surface dirt and feces, the fleece weighed roughly three pounds -- a quite acceptable yield in Usi.

In conclusion, shearing in Usi clearly suffers the effects of the agropastoral dialectic. Villagers cannot afford any but the crudest equipment. Given the press of agricultural tasks and the relatively small size of household herds, few people have the time or opportunity to become expert at shearing. And, the intense manual labor requirements of paleotechnic cultivation in a vertical ecology make it difficult to meet optimal shearing schedules, or even to shear at all. These problems are exacerbated by competition with occasional wage labor and, in general, a nuclear family structure with an ideal of household self-sufficiency. Families that lack adequate labor or skill for shearing all their herd must seek costly assistance. Finally, because of spatial conflicts with agriculture leading to poor animal nutrition (see "Feeding"), wool yields are depressed, especially for sheep.

In short, certainly there is room for improvement of shearing practices in communities such as Usi -- as villagers themselves would likely agree. But development action in this regard will first have to confront serious dialetical constraints on peasants' labor, capital, and technological skills. (See the summary remarks at the conclusion of this report.) Research in this direction might do well to focus on how other groups -- both "pure" and agropastoralist, both in and "out"

of the Andes -- manage shearing. And of course, attention must also be given to Indian's own views and priorities as to how this area of animal husbandry might realistically be bettered.

Docking - Irsinay

Like shearing, docking (removing the tail of sheep) in Usi illustrates the labor constraints faced by peasant agropastoralists, as well as their limited or confused understanding of various management procedures. Taken together, these two factors account for Usinos' highly inconsistent application of this useful technique. They follow it only belatedly, incompletely, and -- to the Western eye -- haphazardly. Indeed, I observed that the majority of village sheep reach maturity with their tails intact.

Like castration (following), irsinay is performed with a small, dull knife and without the aid of cauterization or of commerical disinfectants. Docking takes place in March-April, or whenever the rains cease. Villagers correctly estimate that complications are less likely to arise at this time. I.e. with dry corrals, clear hot days and frosty nights, and reduced parasite activity, chances of the wound's becoming infected or infested are decreased. In Usi, sheep may be docked anywhere from age 1-3 years. This schedule contrasts sharply with that of Puneno pure pastoralists or of Western commercial producers, who generally dock all their flock at 3-6 months (West 1981) or 7-14 days (Ensminger 1970), respectively. But Usinos do not dock a sheep until it clearly "needs it" (see below). Furthermore, they remove only half the tail instead of snubbing it close to the rump. Finally, most respondents state that rams and ewes are equally subject to irsinay. Interestingly, though, one man avows that wethers need not be docked.

Villagers' opinions on the need and rationale for this technique vary. Indeed, some can see no point to docking at all. "What for?" They would sometimes query puzzledly, viewing the operation as yet a further but unnecessary pastoral burden upon household labor resources already strained to the limit by more basic animal husbandry chores plus manifold agricultural and other duties. One woman rationalizes her failure to dock by explaining that thus needlessly spilling animals' blood will cause them to curse their masters. Such attitudes are perhaps not surprising in view of the fact that irsinay finds no traditional parallel in camelid management.

Still, most Usinos dock at least some of their sheep. "Those that need it," they say. The definition of "need" varies. "Because the tail of some sheep is ugly," shrugs one woman. "Because the tail may be too long," says another. "So that the animal will grow fat," a third patiently explains to the benighted anthropologist. Many villagers hypothesize that an outsize tail may account for a sheep's remaining thin and poorly. The tail robs the rest of the anatomy of nourishment, growing ever larger and longer if not docked.

However, by far the most popular reason for docking is to calm especially restless and unruly sheep. Many Usinos claim irsinay causes

such animals to graze more placidly and to jump and bounce about less. People say docked sheep become fatter, more succulent, and more resistent to supernatural ills (see publication No. 4 in this series, McCorkle 1982a). Informants further note that docking discourages rams from "molesting" young ewes. But the paramount concern behind this "calming rationale" is to prevent contrary animals from straying or running off entirely. Sheep afflicted with excessive Wanderlust are an extra nuisance to gather up at night and keep tabs on in general. They are much more prone to accidents, predation, and theft. In addition to these perils, there is the even greater "social danger" of their invading a cultivated field. "Danger" because, if a sheep is caught in this illicit act, its life may well be forfeit. Incensed chacra owners have been known to kick and stone a guilty animal to death, leaving the carcass to rot where it lies or even appropriating and consuming it themselves. "Social" because the net result of such frays is not only the loss of valuable animals but also the "gain" of new enemies and fresh social tensions. Usinos readily verbalize this danger and, once again, they explain that since irsinay reduces ovine desires to spring about and stray off, docked animals are less likely to escape, leap field fences, and gorge themselves on crops.

Not one villager mentions either of the two principal reasons for docking recognized by Western animal science. First, this technique promotes sanitation and hence health. By keeping the britch area freer of mud and dung, it discourages bacterial buildup, disease-bearing flies, and other pests. Second, it facilitates tupping. But Usinos appear to be ignorant of these benefits. Moreover, several of the reasons they do cite for docking are instead those for castration -- to repress sexual appetites, fatten, and calm. Hence, perhaps, one man's astute observation that docking wethers is superfluous.[11]

In sum, villagers' belated and partial operation greatly reduces the health and breeding benefits of docking. Here is one area where the development implications are clear and simple: educate people to dock all their flock, dock earlier, and dock the entire tail. This would seem a feasible goal in communities such as Usi where the technique is already familiar and, rightly or wrongly, is assigned a host of benefits. Without insulting indigenous beliefs, development workers can merely add to this list, pointing out not only the substantial health and breeding advantages that accrue to systematic, timely, and complete docking, but also any benefits that might spark increased interest in this technique. For example, Usinos would appreciate the observation that proper docking would keep sheep droppings more intact. While villagers cook with bovine, camelid, and ovine dung, they complain that the latter is inconvenient because it is seldom integro (see "Corrals").

While change efforts may occasionally fall afoul of idiosyncratic ideologies like one woman's fear of being cursed, the major impediment will likely be dialectic-based labor shortages. These call for considerable insight and "creative thinking" on the part of extension agents. Introduction of speedier tools and techniques may be one option, depending on their cost and availability. Another may be docking and castrating at times when people are already gathered to

cooperate in some pastoral activity. Illustrating from the Usino situation, these operations might be performed at the secondary t'inka in June. Such re-scheduling has several points in its favor. It finds an analogy in ear-branding at the principal, February t'inka. It keeps extant patterns of cooperation intact, sidestepping the difficulties of convincing peasants to cooperate at higher levels or with unfamiliar or untrusted individuals. And, it might even decrease veterinary complications, since by June the rainy season is well past and many parasites are dormant. Of course, solutions to such implementation problems will always be community- and culture-specific, taking into account the realities of dominant economic and political structures as well.

Castrating - Kapay

Genetic control of herds in Usi hinges primarily upon kapay, as Usinos themselves realize. Given dialectical constraints, villagers employ few other breeding techniques (see next section). The importance of castration therefore looms larger than in other systems of animal management practicing herd divisions, selective pairing, and so forth -- where the fattening and taming uses of this technique are instead paramount. While Usinos recognize the taming effects of kapay upon llama (see below), as noted in the preceding section they wrongly assign its non-genetic benefits among sheep to docking.

Kapay is done at the beginning of the dry season, using a small knife. Usinos do not tie off the testicles; nor, unlike many pure pastoralists or some U.S. sheepmen, do they bite them off. Villagers employ no commercial disinfectants, salves, etc. to cleanse and soothe the wound. As among pure pastoralists of the region, camelids are castrated between one and three years of age. Ovines undergo kapay anywhere from six months to two years; some informants even claim the "best" age is at two to three years! Villagers state they commonly castrate all but one or possibly two males (lest the sole stud die) in their herds, both ovine and camelid.

Castration criteria naturally vary by species. In the case of llama, owners say they breed exclusively for size and strength since transport (along, of course, with manure production) is this species' prime function. Llama are not raised with an eye to meat production. Their tough, stringy flesh enters the family stewpot only when they become useless for reproduction (females) and transport (males). And, the llama's value as a source of fiber is distinctly secondary to its carga role. If a hatun ('large' or 'true' llama) "saved for seed" has an especially fine fleece, so much the better. But even a q'ara 'baldy' will be spared the knife if it is large and powerful.

As the figures on household herd composition in the second half of this report attest, llama owners in fact do castrate all but one or two urqu (males) in their herds. Such extensive castration is feasible because of the great security of camelid life in Usi, as compared with the faltering ovine. However, llama kapay is not motivated solely by the conscious desire to improve the breed. Villagers cite a host of additional advantages.

First, Usinos believe that castration greatly increases a llama's physical strength, resistance to disease, and longevity. Second, kapun are valued as superior pack animals and more reliable lead animals for a number of reasons. They are reportedly easier to train, more docile to load and guide, and less given to straying or running off and toppling their burdens. Moreover, kapun do not engage in sexual contests nor are they distracted by passing females. In consequence, they are unlikely to give rise to social tensions over another's injured male or "ruined" female llama (see next section). In general, kapun are less fierce and feisty than haynachu (studs). This is not a trivial consideration, for llama do not just spit. They trample; bite; butt; and kick with a blow reputed to be swifter and mightier than any burro's. In a fracas, llama can seriously injure their own and other species, including humans. Castration reduces the potential for such problems. (Curiously, though, according to Flores 1968:117b Paratian pure pastoralists believe intact males make for better pack animals.)

Indeed, Usino stockowners perceive so many advantages to llama kapay that some will even remove one testicle from their studs! They swear this operation make a haynachu stronger and healthier, mitigates all its undesirable behaviors, yet leaves its reproductive powers undiminished. If anything, the latter are enhanced, according to villagers. There is an associated belief that llama which congenitally lack or fail to drop one testicle are the most virile studs.

For sheep, informants indicate that the genetic aim of castration is fleece improvement. Although size is also taken into account because of its significance for meat production, villagers say it is a secondary consideration. Rams with the finest quality (llamp'u) and greatest quantity (runku) of wool are the ones expressly "saved for seed." As noted in "Shearing," fiber production in Usi is low, particularly for sheep. Hence villagers' genetic focus on fleece improvement seems appropriate. It also makes good sense in terms of the criollo's historical development. In adjusting to the Andes, the domestic breed introduced by the Spanish (mostly merinos and churras) reverted to the many feral characteristics. Among these, smaller size and greater hardiness represented advantages. But the fleece became notably skimpier, dark-colored or piebald, and much kempier. (After Orlove 1977a).

Usinos claim a sheep's future fiber production can be assessed at birth. Regardless of its wool potential, though, one special sort of ram is never castrated -- the miray kastacha. This creature sports two bolitas 'little balls' on its neck and is believed exceptionally virile. I had no opportunity to examine one of these rarities so I cannot say what these bolitas might be. (Perhaps tumors or swollen glands?) However, their appearance in pairs is doubtless suggestive of testicles and quite logically, what could be more potent than a ram with two sets of such equipment?

One anomaly in uwiha kapay requires comment. Quantitative data contradict stockowners' claim that they castrate all but one or two rams in their flock. Of the total male ovine population recorded in the protocols on herd composition, only 21% are castrated. On the

average, families maintain three rams to every wether. Yet this discrepancy is readily comprehensible if we recall the ovine's generally poor adaptation to the high Andes and the rigors of peasants' management. As the year's sampling of loss rates among sheep versus camelids dramatically testifies (see "Herd Composition, Losses and Culls"), there is no guarantee of ovine life and limb in Usi. If all but one or two rams in a flock were in fact castrated, a household could easily be left with no "seed animals" at all.

In short, villagers' stated "ideal" rule of castration -- and its actual application to camelids -- clearly indicate that they understand and value the genetic benefits of systematic kapay. But stockowners also recognize the harsh "realities" of Andean ovinicultureWithin a system of paleotechnic agropastoralism. They therefore wisely bend the rule for sheep. This interpretation of uwiha kapay is supported by further analysis of quantitative data in the second half of this chapter. There, we see that households with many sheep (50+) feel secure enough to approximate the ideal more closely, and consequently castrate more rams. In contrast families with smaller flocks keep almost no wethers.[12]

In like vein, villagers' extremely belated uwiha kapay is readily explained in terms of both developmental and dialectical factors. By Western standards, lambs should be castrated at three weeks of age. However, with poor diet, rampant parasitism, inadequate shelter, high altitude, and so forth, Usi's criollo breed does not reach sexual maturity until some two years of age or later. Females often do not reproduce until age three. (By way of comparison, according to Ensminger 1970, in commercial Western operations ewes can generally be bred at 8-10 months and rams sometimes as early as 5-7 months). Likely even more to the point, again, are the terrific annual ovine loss rates in Usi, particularly among neonates and juveniles. The dialectical implications are clear. Why waste precious labor castrating animals that may well not survive to reproductive maturity anyway?

In sum, Usi's agropastoralists naturally appreciate the genetic control that systematic castration can provide. They recognize a host of additional advantages to llama kapay, although they wrongly attribute the technique's non-genetic effects upon sheep to docking instead. Nevertheless, it is clear that villagers are utilizing castration wisely for both species. In particular, what to Western eyes might seem anomalies in their application of the technique to sheep in fact represent a consummately rational response to the problems of managing an alien and fragile species within the dialectical constraints of paleotechnic agropastoralism. Indeed, as we shall see in the following section on breeding, genetic laissez-faire for ovines may be a good idea in other ways, too.

The immediate implications for development in cases such as this are clear and simple: do nothing. Villagers' management of llama kapay is impeccable. And under their current system of production, stockowner's decisions as to how many or which of their sheep to castrate probably cannot be bettered. Pointing out the non-genetic benefits of the technique for ovines would be gratuitous for, unless or

until the safety and well-being of stud rams can be assured in such communities, extensive castration would only imperil flock reproductivity and, with it, families' very subsistence.

Finally, even where intervention is feasible, careful consideration must be given to peasants', as opposed to projects', goals in genetic control. Projects often focus upon upping meat off-takes, with the ultimate aim of funneling more food into the national sector, e.g. to feed burgeoning urban populations and forestall unrest in the cities. Peasants may instead give priority to production for consumption or prestige, to augmenting their animal "savings accounts" (in turn raising questions of overstocking and overgrazing), or, like Usinos, to enhancing wool yields. Projects may have to strike a delicate balance among these priorities. Except by fiat, the success of intervention will assuredly rest in large part upon responding to peasants' own perceptions of the need for genetic control and improvement.

Breeding

Aside from castration, little else is done at the household level to manage breeding or birthing of herd animals in Usi. It is easier to state at the outset what villagers don't do before turning to the few mechanisms of control they do exercise. Again, their "non-management" is largely a function of the agropastoral dialectic and consequent lacks in veterinary knowledge, capital to implement such knowledge as is available, fencing and adequate care facilities, and above all, lack of time and labor for full attention to breeding. Exacerbating such constraints are villagers' understandable reluctance (McCorkle 1982b) to aggregate household herds on a scale large enough to make feasible even those breeding techniques that would then require no additional inputs of capital or labor.

These constraints are aptly illustrated in Usinos' failure to divide herds by sex and reproductive group for purposes of specialized mating, medical care, feeding, fattening, sheltering, and protection -- benefits of particular importance for pregnant or lactating animals and newborns. Yet without large-scale aggregation, plus the necessary equipment and structures, such divisions are manifestly impractical in a poverty-level community where household herds average 26.8 sheep, 5.2 camelids, and occasionally one or two head of cattle.

Given the lack of herd divisions by sex, neither can Usinos control breeding times. This is of small matter for the native camelids, since their estrus and rut cycles are adapted to the environment. They drop their young at the beginning of the warm rainy season, when pastures for lactating mothers and newborns are lushest and cold stress is least. But the alien ovine is not thus adapted. The estrus cycle of ewes is keyed to changes in the number of daylight hours across the months. In the tropics, however, day length is essentially constant. Lambing therefore occurs throughout the year. Moreover, whereas camelid births always take place in the morning so that the young spend their critical first hours in the warmth of the sun, ovine births are usually at night. (After Orlove 1977a:208.) The

result is heavy ovine neonate mortalities, particularly among lambs dropped during the six-month-long cold season, when forage is scarce, flocks are starving, and the nights are freezing.

With all the ovine's special problems, one might suppose that Usinos would at least try to pay some extra attention to pregnant ewes. But they do not. For both camelid and ovine mothers-to-be, no special provisions are made, e.g., for: richer feed; warmer, dryer, or cleaner quarters; crutching (shearing around the udder, flank, and dock) to make for easier, more sanitary births and to facilitate nursing; monitoring pregnant ewes' movements or the onset of labor; and so forth. Birth takes place wherever the mother happens to be at the time -- in the countryside, in the corral, or in transit between the two. Pregnant animals are driven to pasture daily, no matter how rugged and remote the grazing grounds or how imminent parturition. Nor do Usinos assist at births, even for unusual presentations. Many villagers wrongly believe that if a human touches a newborn sheep, its dam will disown it. This belief does not apply to camelids, however. Shepherds may therefore lend some postpartum assistance; e.g. camelid offspring dropped in dangerous spots (on a cliff, close by a river, etc.) will be carried to safer ground. Finally, humans also play no role in weaning. "The mother sees to that, say villagers.

The one exception in all this inattention is the immensely valuable bovine. Pregnant cows get extra rations, remain at home in the corral when their time is near or graze only on lush riverine meadows close by, and receive human assistance in both birthing and weaning.

In short, both llama and sheep largely see to their own breeding and birthing, as Usinos are fond of reiterating. Informants express surprise when queried if, like pure pastoralists, they ever assist and guide a hayñachu stud llama' in mounting a female. They chuckle that the animals "know just what to do." Nor do stockowners concern themselves over interbreeding between animals belonging to different owners. Given cooperative pasturing practices such as joint herding, t'inkikuy, boarding, etc., (McCorkle 1982b) and muyuy grazing (see next section), herds of various households are frequently thrown together, with the expectable result that they freely interbreed. Villagers essentially assume a "boys will be boys" attitude towards the whole matter. They become irate only when another's hayñachu mounts a pregnant female (see below).

Turning now to what Usinos do do, there is one minimal mechanism of control in llama breeding. Any villager who sees that another has an especially fine stud may ask to "borrow" it for servicing. If the two people are on good terms the request will be granted. The borrower incorporates the hayñachu into her/his own herd for several days. If the desired results are not achieved immediately, the animals can always be borrowed again later. No recompense is required or expected for such services. Indeed, informants seemed faintly puzzled or indignant at my queries concerning "stud fees." The notion of "sex for sale" among animals is alien to them.

For ovines, there is one minor genetic control mechanism. Black sheep are actively selected against. A European-derived belief holds that they bring bad luck and death to their owners. Some people extend this belief to black spotted sheep, as well. The cautious stockowner unceremoniously dispatches such animals at birth. Others, more economically minded, wait until their black sheep reach age two or so, on the threshold of reproductive maturity, and then sacrifice them in a ceremony designed to negate the bad luck.[13]

In birthing, the only measures Usinos take are steps to avoid abortions, sulluchi. Villagers observe that camelid abortions can be triggered by a number of events: (1) a serious fall, (2) diarrhea, (3) a kick in the belly, (4) relatedly, the crushing press as a herd exits the corral door, and (5) stockowners' favorite complaint, a hayñachu's mounting the pregnant female. The latter is believed to cause not only abortion but also permanent sterility. The china is said to be malograda 'ruined'. Villagers add that if a female llama is employed even once as a pack animal, it will likewise abort and become sterile. Hence they try to keep pregnant china away from hayñachu and literally never use females as beasts of burden. With the exception of (5) above, sulluchi among sheep occurs for much the same reasons, say informants. However, as smaller creatures, ovine mothers-to-be, and their young, run greater risks of being kicked, trampled, or crushed by their larger herdmates. Whenever possible, households therefore quarter their ovines separately (see "Corrals").

Stockowners sadly observe that despite their preventive measures abortions are common in all herd-animal species in Usi. But with characteristic peasant thriftiness, a use is always found for the foetus. Llama foetuses in particular are greatly prized for their magical power in t'inka despacho and so are carefully dried and stored away until the next ceremony. Well-developed foetuses of sheep and alpaca render meat, and for alpaca, sometimes a fleece that can be sold to crafters of tourist items.

Aside from castration and the more minor efforts at control detailed above, the most intriguing mechanism of breeding lies not at the household but at the community level. Predictably, too, it has to do with sheep. As noted in the section on slaugther, for ideological reasons there is a general proscription on live animals' departing the community. Beyond this, however, there is also a strong proscription on bringing in "outsider" sheep as replacement, start-up, or brood stock. In other words, for ovines there is a rule of "community endogamy," as it were, paralleling that for humans.

The principal reason for this rule, says informants, is disease control. Villagers are firmly convinced that other communities' sheep carry horrible plagues. To judge by Usi's own flocks, they are probably right. (see publication No. 4 in this series, McCorkle 1982a). Relatedly, animals obtained locally have the advantage of more familiar pedigrees and individual histories. Moreover, purchases made community-internally are not subject to the ethnic dominance mechanisms and extreme negative reciprocity of external transactions. Finally, as noted above, neither do Usinos bring in "outsider" improvement stock,

such as merinos or corriedales, purchased from neighboring pastoral haciendas, cooperatives, or, like llama, from pure pastoralists or at annual fairs. Villagers quite accurately observe that these fancier breeds cannot survive Usi's poor pasturage and rigorous management. One risk-taker's defiance of the proscription proves the rule. He bought several merinos which, as the entire community predicted, promptly died. He himself agrees that inadequate pasturage was to blame.

In short, for quite logical reasons backed up with genuine experience, people desiring to add to, initiate, or improve their flocks acquire sheep within the community. The result is that, for ovines at least, the whole of Usi constitutes a single genetic pool forming a tightly delimited, closed system. The extent of in-breeding is suggested in villagers' variety of terms for, and the observable fact of, physical aberrancies occuring with a frequency seemingly greater than chance among Usi's ovines (McCorkle 1983). This rule of "community endogamy" for sheep may have one further consequence not verbalized by Usinos. Coupled with the tendency to genetic laissez faire for ovines, exclusion of "unknown" stock that may require richer forage, lower altitudes, more benign management, or whatever, may enhance adaptation of this alien species to the hostile realities of Andean agropastoralism.

In conclusion, the implications for development of animal breeding and birthing in communities such as Usi are more murky than those of docking or castration. While there is clearly room for improved maternal and neonate care, just as clearly extension efforts will run up against capital and labor shortages for such care. Likewise, without revamping the entire system of animal management (and with it, much of village social and economic structure), introduction of "improved" but more delicate breeding stock would be foolish. Moreover, as in Usi, efforts in this direction might conflict with traditional, but highly rational, proscriptions on "outsider" animals. If anything, emphasis should be placed on upgrading "nativized" breeds. In selecting characteristics for improvement, the remarks at the end of "Castration" apply here, too. However, the implications of a "hands off" breeding policy coupled with a "rule of endogamy" for non-native species are intriguing. Such folk practices may have the consequence of enhancing animals' adaptivity to an alien environment.

Feeding

To conclude the annual management cycle, we turn now to the single most basic aspect of animal husbandry: feeding. "Basic," yes; but hardly simple in a generalized paleotechnic mountain procurement system such as Usi's, where nuclear families endeavor to exploit the maximal variety of plant and animal species possible within a vertical ecology. Due in large part to dialectical constraints, villagers must forego many range-management and feeding techniques utilized in Western and even Andean pure-pastoral operations.

For example, Usinos do not burn, grub, cut, fence, seed, irrigate, hay, or in any way chemically treat rangelands. Neither do they

construct artifical uq"u (Spanish bofedales; localized areas which retain moisture and hence pasturage year round) to provide strategic dry-season forage, as reported for some Andean pastoralists. And, other than grosso modo dry-season/wet-season shifts, villagers follow no organized system of pasture rotation. With regard to feeding, livestock receive no supplemental grains, tubers, etc.. not even barley, as among some Andean agropastoralists (cf. LeBaron et. al. 1979:204 and West 1981). With the scarcity and low productivity of arable land in Usi, people can barely feed their families, much less grow fodder or food crops expressly for their herds. Nor do villagers prepare silages or mow natural grazes for hay; in any case, the Andean grasses are unsuitable for hays. Certainly, they do not purchase commercial concentrates, vitamin and mineral supplements, or other accessory rations (antibiotics, hormones, etc.). In fact, stockowners can seldom even afford salt.[14]

In sum, then, what does feeding entail in Usi? The topic is best examined in two parts: pasturing patterns, and dry-season foddering with agricultural byproducts. Together, these cover the gamut of feeding options in Usi. They also illustrate in a particularly concrete way both positive and negative interactions between cultivation and herding inherent in peasant agropastoralism.

Pasturing Patterns. Three principal pasturing patterns are identifiable in Usi. I begin with what we may call the "majority pattern" because more than 85% of all stockowners in Usi follow this strategy or some variation thereof. It is also the one detailed in Figure 3 and diagrammed more fully in Table 2 following. In this system, all species are generally herded together. They are daily driven out to pasture about 8:00 in the morning and returned around 4:00 to the household corrals in the nucleated settlement. The majority pattern is ideally characterized by differential seasonal utilization of the varying ecozones and their forage resources, both natural and agricultural, available within the community territory.

Beginning with the onset of the rains in November-December and continuing through the warm wet season, herds exploit the intermediate agrolife zone. There, they intensively graze the fallowing muyuy along with the lusher pampas (relatively flat areas, also fallowing plots) which border the stream bisecting Usi. During this time, spatial disjunctions between herding and other activities are at a minimum. Walking time to pastures is a matter of minutes. And, grazing grounds may lie within view of the house site or handy promontory, or of the fields being worked. People therefore feel secure in sometimes leaving their animals unattended, but with frequent checks, to go about more pressing domestic or agricultural duties. Given this proximity to home and fields, it is especially feasible for households to take turns at overseeing pooled herds across the day. A portion of the household's pastoral workday can thereby be assigned to other chores. Finally, parents feel more confident about allowing their youngest children (age 5-6) to herd under these circumstances. This, too, frees more, and older stronger, labor for other tasks.

TABLE 2 -- THE "MAJORITY" PASTURING PATTERN*

MONTH	NOV DEC JAN	FEB MAR APR	MAY JUN JUL	AUG SEP OCT
PERIOD	First half of rainy season and major planting period	Second half of rainy season	First half of dry season and harvest period	Second half of dry season
LOCALE	Fallowing muyuy and pampas in the intermediate zone		Freshly harvested muyuy	The punas
RATIONALES	1) With the onset of the rains, pastures "down below here" are lush and fresh. There is therefore no need to drive herds to higher grounds. Areas closest to the nucleated settlement are exploited first. 2) Herders are conveniently located for ancillary duties during this, the principal planting, period. 3) Relatedly, animals within q"away 'seeing' distance can be left periodically unattended. And close to the safety of the village, the very youngest children can herd, thus freeing more adult labor for agriculture.	1) Intermediate zone fallow land pasturing continues, but generally now in muyuy more distant from the nucleated settlement since the areas closest to the village have been so intensively grazed during the preceding three months. (Spatial disjunctions are accordingly increased.)	1) After six months of intensive grazing and with the onset of the dry season, fallow land forages are exhausted and desiccated. Animals are now pastured on the rich weed growth and crop residues of the freshly harvested muyuy. 2) Herders are close by for helping with harvesttime chores. Indeed, herds may follow right along behind harvesters in the chacras. And, llama are at hand for their transport duties.	1) With both fallow land and crop residue grazes exhausted, and with the dry season at its height now, herds must be driven daily to the punas. 2) Pasturing in the cooler punas forestalls calor 'heat' related ills among herds. (Spatial disjunctions between herding and cultivation peal now.)

*Throughout the year, herds are nightly quartered in household corrals in the nucleated settlement.

With nearly the entire community exploiting these intermediate-zone fallow lands for pasturage, they are rapidly exhausted. The areas closest to the nucleated settlement are naturally the first to give out. By as early as February, they are grazed to a nubbin, with only the poisonous loco husq'a left standing. In consequence, pastures must be sought farther and farther afield. At the same time, though, considerable household labor must be on hand for the massive task of barbecho 'footplowing' of fields for next year's planting. All plowing must be completed while the ground is still soft from the rains and before the hectic harvest seasons begins in May. Men must therefore give their full attention to this work. As noted earlier in "Shearing," since barbecho is performed with ayni, women, too, are kept extra busy cooking and transporting huge meals during this time. Children naturally assist in these tasks. Meanwhile, of course, ideally people should also be attending to shearing at this time. In short, during this second half of the rainy season, coordination of agricultural and pastoral duties becomes more difficult.

By May, when the dry season is gearing up, even the most distant muyuy have little forage left. At this point, another and crucial feed resource comes into play -- the freshly harvested fields of potatoes, barley, ulluku, añu, and habas. This is a veritable feast, for the animals benefit not only from the crop stubble but also from the rich growth of weeds and grasses that have escaped the q"uray 'weeding'. (Sheep are especially efficient gleaners thanks to their small size and close-to-the-ground bite.) It is also a very timely feast, for it furnishes forage of the highest protein-content of the year, just before herds enter their leanest months. While stubble pasturing affords all animals a final fattening, in particular it gives newborns a better chance to develop and put on weight before they are faced with their first famine. It is noteworthy that no one bit of this valuable feed resource is wasted. Once harvested, any unfenced area in the intermediate zone is open for stubble pasturing by the herds of any community member. This includes the plots of estancia operators (see below) and of people who own no herd animals.

Obviously, at this point in the annual cycle of agropastoral activities, cultivation and herding reach a zenith of integration -- both spatially and otherwise. Herders are close at hand for helping out with harvest-time chores. Indeed, sometimes herds follow right along behind harvesters in the fields, manuring and reseeding/trampling as they go. And, beyond profiting nutritionally from stubble grazing, in their function as gleaners animals ensure that full productive use is wrung from agriculture.

In normal years, stubble pasturing reportedly lasts until late July. However, stockowners observe that it may cease a month earlier if the harvest is poor. Conversely, in a bumper crop year, it may con[illegible] until the end of August. But by September at the latest, what l[illegible] vegetation has escaped the previous eight to nine months' intensive grazing in the intermediate zone is, in one man's words, "all dried up and burned away" by the fierce sun and nightly frosts of the dry season. Pastures will remain thus until the rains return, hopefully in November, to restore the more frail florae of this zone.

Meanwhile, herds must now be driven daily to the punas. There, the hardy Andean bunch grases, ich"u, survive in large pajonales despite the drought. Although the desiccated, dormant bunch grasses of the dry season are not highly palatable to any species, llama will consume this graze more or less readily and, in lieu of any other forage, so will starving sheep (West, pers. com.). Also, more palatable forbs and smaller grasses grow around and within the ich"u's clumped base, where they are protected from the wind and watered by melting snow accumulated there or the runoff of dew and frost from its spiky leaves (Orlove 1977a:83). Forage flourishes, too, in and around puna lakes and streams and in areas moistened by melting snow or groundwater seepage. Informants add a further reason for exploiting the punas at this time: they are cooler than the pastures "down below here." Villagers believe the blistering high-altitude sun of the dry season, when there is no protective cloud cover, engenders all manner of calor 'heat' ills in their herds.

Usinos are fortunate in enjoying access to extensive high-zone rangelands. And, they convincingly argue that a multitude of benefits accrue to herds (ovines and camelids) regularly pastured there. Besides minimizing heat-related ills, the lower temperatures of the high zone greatly stimulate fleece growth and quality, say villagers. The cold also discourages many types of parasitism. While sheep are more prone to various respiratory ills at these higher altitudes, West (pers. com.) agrees with Usinos, judging that losses to such ills are outweighed by decreased parasitism -- the biggest health problem of ovines the world over (see Ch. 6). Usinos further note that the stands of wool-pilfering thorn (a favorite lament of stockowners) which flourish at lower altitudes are rarer in the punas. Poisonous plants are fewer, too. And thanks to the supposedly more abundant puna grazes, hungry animals are less frequently tempted by these more unpalatable, toxic florae. Finally, better health and diet in turn enhance fertility, lactation, and neonate survival.

In sum, Usinos uniformly avow that herds kept in the punas are healthier, fatter, more finely fleeced, and reproduce more rapidly. There is support for this claim in that those household herds which do follow a year-round regime of puna pasturing (see below) are in fact the largest in the community and, at least upon cursory inspection, give the impression of greater thriftiness.

Under the majority pattern, however, puna pasturing is problematic. For one thing, precisely at the time of year when high-zone rangelands must be utilized (August-October), agricultural activities at the opposite extreme of the community's ecology are most intense. In the low zone, the irrigated, maway, potatoes and the principal maize crop must be planted. Then, along with the early, miska, maize, both must be hoed; the maize fields require weeding as well. Meanwhile, too, llama must be on hand "down below" to perform their annual task of transporting manure to next year's intermediate-zone potato fields. And, humans are still busy processing and storing the preceding period's harvests.

Moreover, walking time from the nucleated settlement to the high-zone rangelands is an hour or so each way. This considerably lengthens the normal 8:00-4:00 pastoral workday, robbing households of additional labor time for other pursuits. The distance involved also means the herder is unavailable even for brief tasks at home or in the fields. Worse still, the labor lost is that of able-bodied adolescents and adults. Because the dangers of accident, predation, theft, and even bodily attack are considered much greater in the lonely punas, youngsters are seldom allowed to herd there. The energetic savings they represent (Thomas 1973) are therefore also lost -- precisely when cold exposure and extra hiking and climbing entail increased caloric stress. Under the majority system, puna pasturing raises still other problems. Excessive travel to and from nightly bedgrounds stresses herds as well as humans. Considerable vegetation may be destroyed en route. And hungry animals being trailed to remote rangelands are more likely to consume toxic or lethal quantities of poisonous plants.

In fact, so pervasive are the difficulties of regular village-to-puna droving and overseeing that, on days when other duties press and/or appropriate labor is unavailable, stockowners will fall back upon the denuded pastures of the intermediate zone. The consequences for animal health and nutrition are predictable, and are readily described by Usinos. But the difficulties arising from spatial/labor disjunctions in puna pasturing, coupled with the ideal of household autarchy, preclude majority system practitioners from full or consistent productive use of community rangelands.

In an effort to get around these problems and at the same time reap the considerable pastoral benefits of puna herding, a few Usinos opt for a different strategy: either the puna estancia or the "mixed" pasturing pattern. Significantly, these are people with, by village standards, substantial pastoral holdings: 50 to 100+ sheep as versus the average 27, and reportedly double or more the usual four to seven camelids. More importantly, practitioners of these patterns appear to have direct access to greater-than-average household labor resources (see below). Indeed, an "extra" quotient of labor seems to be criterial to these two patterns' functioning and to the fuller exploitation of rangelands they allow.

In the first of these two strategies, the household permanently quarters its entire herd, even cattle, at a high-zone estancia 'ranch'.[15] Scattered across the puna pampas, these establishments are typically very simple affairs consisting of one small, windowless stone hut with a number of corrals attached. Any Usino may set up a ranch, for the punas are ayllu (communal) lands, free to all. However, in order to maintain a ranch, some family member (minimum age 15-16) must be released from all other duties to attend full-time to its operation. He (or less commonly, she) lives there year-round -- although the herder is usually "spelled" for a few days each month or so to attend village fiestas, travel to market, or just visit "down below."

Still further inputs of labor are imperative to estancia operation, however. Every evening, an adult kinsperson must hike up to the ranch only to depart again the next morning around 5:30 to return

to her/his duties below.[16] While other Andean groups practice various forms of transhumance and/or seasonal splitting off of household personnel secondary or even tertiary residences or encampments in order to accommodate herd feeding needs vis-a-vis agricultural schedules, this peculiar caminando arriba y abajo aspect of the Usino estancia operation is, to my knowledge, unique in the literature. This individual shares a meal with and provides company for the estancia overseer, and perhaps carries up some avio (food and other supplies). Above all else, the companion furnishes extra protection for both herds and herders through the lonely puna night.

Now, this estancia strategy is instructive in that it tackles the coordinative challenges to daily herding in quite a different --indeed, almost an opposite -- way from the majority or "mixed" (see below) patterns. Rather than struggling to integrate cultivation and herding as intimately as possible, it instead seeks to mitigate disjunctions by further divorcing the two. This divorcement is evidenced, for example, in the fact that ranch animals are denied the richesse of stubble pasturing and, conversely, agriculture is denied their services in the gleaning, direct manuring, reseeding, and etc. of fields.[16] The result is that, while still overlapping in many ways, estancia owners' agriculture and pastoralism coexist as relatively more separate and distinct enterprises.

Estancia owners themselves perceive a number of advantages to this separation, however. Beyond producing thriftier and larger herds, the puna regime, they say, greatly decreases the likelihood of epidemics (which they believe often arise from the contagion with majority-system animals) and of opportunistic thefts. (See publication Nos. 4 and 5 in this series, McCorkle 1982a,b.) Estancia operators also point out that year-round puna pasturing essentially does away with another, different sort of spatial conflict between agriculture and pastoralism, and a significant source of social tensions: animals' invasions of cultivated fields.

Although unverbalized by ranch owners, doubtless a further factor in puna herds' success is that they are tended by a pastoral semi-specialist in the form of the estancia overseer. The ranch operator constitutes the closest thing to a "herding specialist" in Usi. She/he is in almost daily contact across years with the same, sizeable herd. This affords a practical opportunity to study at length important management subjects such as: the various species' social behaviors, developmental cycles, and micro-genetic trends; the quality of different forages and their specific local and seasonal distributions; the precise syndromes and progress of diseases and the relative efficacy of various cures; and even the life histories and idiosyncrasies of individual animals. Such knowledge perforce makes for better animal management. Moreover, in dialectical terms, the designation of one household member as a herding specialist mitigates informational disjunctions between cultivation and herding within the productive economic unit.

Still, while estancia operation solves certain of the problems inherent in the majority pattern, it poses others of its own. Specifically, people cite the extra expense and effort of keeping the ranch supplied, in good repair, and constantly and competently staffed. Estancia owners therefore often take in "boarder" animals from other families in exchange for assistance in meeting these costs. But these associations in turn open the way to serious conflict over animals and their care (see McCorkle 1982b). Even with such assistance, the average nuclear family (5.5 members) can hardly spare one of its number for permanent residence in the punas. In this regard, it is significant that most households following the estancia strategy are blessed with sibling sets of five to six. Yet even given such ample family labor, fulltime staffing of a ranch is problematic. Usinos say young people today resist this lifestyle, finding it too harsh and remote.

Above all else, however, villagers cite the many dangers of the punas -- most notably, attacks by puma, condor (see "Predators"), and murderous rustlers. Villagers emphasize that these latter, in particular, are what have led many people to abandon their estancias over time. (Interestingly, highland agropastoralists of the central Andes also cite rustlers as the prime reason for abandoning páramo pasturing; see Stewart et al. 1976:387. For those who continue this regime, such dangers are also what necessitate that unique features of Usino estancia operation -- an adult's nightly hike up to the ranch, day in and day out across the year. This constitutes a further drain on family labor resources and aggregate caloric reserves. Or, as one man pragmatically phrases it, "Most people just don't want to do all that walking." The result of these and the foregoing problems is that today, no more than then estancias remain in operation.

The "mixed" pasturing pattern, now, is something of a hybrid between the estancia and the majority systems. Essentially, it consists of seasonally alternating herds between permanent household corrals in the nucleated settlement and a temporary estancia situated in a fallowing muyuy at the lower limits of the puna. A muyuy estancia is perforce temporary because it must be moved every four years at a minimum, when the sector comes under agricultural production again. The annual schedule of shifts, and the rationales behind them, are presented in Table 3 following. Obviously both pastoral and agricultural considerations are at work in these shifts. However, the pastoral rationale -- i.e. positioning herds so as to take maximum advantage of the best forage available at any given season of the year -- is alone sufficient to account for the pattern of movements. I therefore list it first in each section of the Table. The Table should be self-explanatory.

When animals are quartered in household corrals, daily herding movements and personnel follow the majority pattern. When herds are quartered in muyuy distant from the nucleated settlement, the same hiking back and forth as for puna estancias obtains. But these strains are considerably eased in years when the estancia is located in a sector closer to the village. For one, younger herders and females can be employed. And although an adult still must go to accompany the

TABLE 3 -- THE "MIXED" PASTURING PATTERN

MONTH	NOV DEC JAN	FEB MAR APR	MAY JUN JUL	AUG SEP OCT
PERIOD	First half of rainy season and major planting period	Second half of rainy season	First half of dry season and harvest period	Second half of dry season
LOCALE	Animals are quartered in household corrals in the nucleated settlement	Animals are quartered at the muyuy estancia	Animals are quartered in household corrals in the nucleated settlement	Animals are quartered at the muyuy estancia
RATIONALES	1) The pastures "down below here" are lush and fresh due to the onset of the rains. There is therefore no need to drive herds to higher grazing grounds. 2) Herders are conveniently located for ancillary duties during the principal, muyuy, potato planting and the sowing of other crops (e.g. maize, habas) in lower zones.	1) As intermediate zone pasturage begins to give out with nearly all the community's animals grazing there and the dry season's approach, herds on muyuy estancias are more conveniently located for alternative grazing in the punas. 2) Mixed-pattern practitioners cite a further reason for a shift at this time. After months of rain, household corrals are dangerously mud- and muck-filled. There is increased risk of parasitism, hoof rot, neonate drownings, etc. Hence, too, the move to higher, dryer corrals.	1) Animals are better located to take advantage of stubble pasturing in the freshly harvested chacras. 2) All family members are close at hand for harvesttime chores. These include not only collecting the produce but also "sleeping out" in the fields to protect the ripening crops from theft until they are harvested, processed, transported home, and safely stored away. 3) Also, llama must be on hand for transporting the harvests home and carrying manure to the potato fields in August.	1) The stubble "feast" is over, sub-puna grazes are exhausted, and the dry season is at its height. Puna pasturing is now necessary. The muyuy estancia is better located to exploit this dry-season resource. 2) Pasturing in the cooler punas forestalls calor 'heat' related ills among herds.

herder every night, the walk is not so far. Cooking and other arrangements are simpler, too. Adults can take all their meals "at home," departing for the estancia after dinner and returning before breakfast. The shepherd/ess often accompanies them back down, leaving the animals briefly unattended, to share the morning meal and collect a cold lunch and/or dinner, cocabí, for the day.

The benefits of this mixed pattern should be apparent from Table 3. It reaps the principal advantages, to both herds and herders, of the majority system -- i.e. stubble pasturing, and proximity to home and fields, especially during the times of heaviest agricultural labor. Through fuller exploitation of high-zone rangelands, it also garners more of the productive pluses associated with permanent puna estancias. At the same time, the mixed pattern minimizes many of the disadvantages of these other two pasturing regimes. In a sense, it captures "the best of both worlds." Still, it shares nearly the same labor requirements as the puna estancia. Predictably, therefore, very few villagers follow the mixed pattern (currently only two to three). And again, they enjoy direct access to greater supplies of labor -- either in the form of bigger sibling sets or, more commonly among this group an at-least-temporarily bilaterally extended household, i.e. parents plus grown children of either sex and their co-resident spouses and progeny.

Finally, now, variations upon and combinations of the pasturing patterns described above are also practiced in Usi. These largely relate to the problem of multiple-species management. As noted, under the estancia regime, stockowners herd all species together. Likewise for most majority-pattern practitioners. This means, however, that no one species is always afforded -- vertically and seasonally -- the altitudinal zone and forages best suited and potentially available to it. For example, according to authorities and villagers alike, cattle fare poorly in the punas. As Thomas (1973:33) writes, cattle do not thrive at the higher altitudes. They have difficulty grazing the shorter puna grasses effectively. Lacking wool, they suffer from the cold and wet far more than sheep or camelids. And both fertility and calf viability are depressed. At the highest altitudes (4,300+ m) sheep, too, encounter difficulties, notably in the respiratory system. Yet just the opposite is true of camelids; they visibly thrive in such environments.

One solution to such problems of multiple-species management under rangestock conditions is to subdivide herds. This makes possible specialized attention to the differing needs of each species (e.g. in feeding, foddering, watering, social behaviors, health care, protection from predators), thereby enhancing pastoral yields. In fact, as an elaboration upon the majority pattern, a few Usinos endeavor to institute such divisions. While ovines continue to follow the majority pasturing regime outlined in Table 2, bovines and/or camelids may be managed separately.

Predictably, cattle in particular receive special attention. They are the most delicate and costly species. And in comparison to the other herd animals, they require enormous amounts of water and feed,

plus a higher quality feed. They may therefore be herded separately along the lush riverine pampas and at the boundaries of the intermediate and low agrolife zones. Cattle can thereby graze the far richer forages of these areas and at the same time escape the deleterious effects of higher altitudes. Naturally, though, this practice places an added strain on household labor resources. In consequence, very few families follow it. Again, only households enjoying an "extra" quotient of labor are generally able to do so. However, there are alternatives in the form of staking and small-scale pastoral associations; (see McCorkle 1982b.)

A few villagers also graze their camelids and ovines separately. One concern is to forestall injuries to sheep from the larger, feistier llama. Another is to keep one's camelids from mixing in with others' herds on the crowded muyuy so as to avoid injury to pregnant females from excited studs (recall "Breeding" again) and the general contagion[17] attributed to animals regularly grazed on muyuy. A third is, again, to exploit the lusher vegetation of lower altitudes.

Separation of camelids is usually accomplished by allowing them to graze at will, unattended, once installed in some general area in the morning. This is feasible because of certain characteristics of camelids, or llama at least. Generally, they will not stray far, will keep together as a group, and will return home at night of their own volition.[18] As larger, stronger, and more aggressive creatures, llama are also more impervious to predation than either sheep or alpaca. And, for a variety of reasons, they are more difficult to "rustle" than other species (see "Theft," in publication No. 5). Also unlike sheep, llama are little given to leaping chacra fences and/or trampling and despoiling crops. Furthermore, they dislike habas, 'broad beans',[18] the principal crop of the intermediate/low-zone boundary. In short, in contrast to the case for cattle, this technique of subdividing llama requires little additional input of labor. Still, the risks of straying, theft, predation, and so forth involved in leaving any livestock unattended are greater than for supervised animals. So again, few villagers regularly opt for this strategy.

As an alternative, some people board their camelids at another household's puna estancia. Stockowners expressly state they do so with an eye to improving the animals' health and diet. Such arrangements compensate for a portion of the added labor entailed by subdividing herds. In exchange, however, boarders must donate labor to the upkeep of ranch facilities and must occasionally substitute for the puna herder or his night-time companion. Moreover, boarding indirectly introduces a new source of conflict between agriculture and pastoralism in the form of costly avio (primarily foodstuffs) payments every month. In effect, boarders are put in the position of having to "pay out" agricultural produce -- produce which would otherwise go towards human consumption within the household -- in order to support their pastoralism.

In sum, villagers are clearly aware of the advantages of subdivisions for managing their multiple-species herds. Yet subdivision is just as clearly the exception rather than the rule in Usi. Again

because of dialectical conflicts, this simple, "rational" technique of animal management is unavailable to most families.

Foddering. Technically, "fodder" refers to entire plants with their leaves, stalk, and fruit intact; "straw" specifically designates cereal stalks after drying and threshing. In Usi, of course, all fruit is removed for human consumption before agricultural products are fed to animals. Technically, such byproduct materials -- low in nutritional value -- are termed "stovers." However, as an inclusive terminological convenience, here I opt for the more familiar "fodder." Usinos carefully husband agricultural byproducts as strategic feed for herd animals during the leanest and most difficult months of the dry season (September-November). After cutting, drying, and threshing (see Fig. 3 again), corn stalks (challa), bean stalks (k'aspi), and wheat and barley straws (pajas) are warehoused until the height of the dry season, when stubble and muyuy grazes give out. This stover is then doled out bit by bit until it, too, is exhausted. The feeding technique is simplicity itself. As noted in the following section on pastoral structures and equipment, no hay racks, feed troughs, mangers, or etc. exist in Usi. The day's fodder ration is merely deposited in a heap on the corral floor. The richest of these byproducts, challa, is reserved to the more precious, delicate and voracious bovine and to the occasional burro. Ovines are allowed only k'aspi and paja. Camelids, however, receive no supplemental feeding. They generally scorn any form of cut, dried forage, say informants. And except in years of extended drought, camelids seem to manage well enough on the naturally occurring dry-season grazes. As Fernandez Baca (1975:4) and other researchers report, camelids are able to absorb and utilize the energy in the poor-grade and lignified grasses of the dry-season punas far more efficiently than old world ruminants.

Challa requires some special comment. Less than fifty percent of Usino families own cattle. Even a single head represents a major investment, roughly equivalent to two llama or six sheep. Stockowners are therefore especially concerned to reduce the risk of loss among this costly species. But as noted above, cattle require far more, and better, feed. Providing this alimentation during the dry season is problematic, especially given that villagers can spare none of their crops for feed. Challa must therefore fill the gap. Yet vey few families in Usi have enough maize fields to be self-sufficient in challa for their cattle. This fact, coupled with challa's avowedly critical role in getting cattle through the dry season, has made it a valuable exchange item. Indeed, unlike k'aspi or paja, it functions as something of a special-purpose money, for it is the coin in which oxen rental is preferably paid.[19] Families who own no oxen yet need to plow their low-zone plots are obliged to hire a yunta 'team' from a co-villager. Such challa-for-yunta transactions obviously benefit both owners and non-owners of cattle.

The importance of dry-season foddering with agricultural by-products is manifest in the fact that 100% of the stratified sample of village stockowners report they follow this practice. Particularly in the majority pattern, foddering helps mitigate dry-season spatial disjunctions somewhat. E.g. on days when herds cannot be driven to the

punas, extra rations of stover may offset inadequate intermediate-zone grazes. More broadly, though, agricultural byproducts may partially compensate for pronounced nutritional deficiencies characteristic of drought-ridden, winter ranges. Pastures are leached and bleached, and their florae are dormant or overly mature. In consequence, dry-season ranges are notably inferior in, e.g., protein, phosphorous, carotene (vitamin A), and energy (calories). Of course, when fodders are cut at an early stage of maturity and left intact, they are much richer in these and other nutrients. In contrast, Usi's stover feeds are of poor quality. Still, they are the best to be had under the straightened circumstances of Andean peasant agro-pastoralism.

In sum, without the strategic feed resource which agricultural by-products represent, dry-season herd losses in Usi would almost certainly be even greater than they already are -- at least among the non-indigenous species. But due to the low productivity of Usino agriculture, fodders are of poor quality. Moreover, supplies are extremely slim. Even with the most miserly rationing, they seldom last the length of the dry season. Informants note that in years when the rains return belatedly or not at all, herd losses skyrocket in consequence.

Summarizing in dialectical perspective, now, feeding practices in Usi concretely illustrate both integrative and disintegrative aspects of the relationship between cultivation and herding in a paleotechnic adaptation. Fallow and stubble grazing -- as in the majority and mixed patterns -- of course constitute one of the classic examples of complementarity between the two subsistence systems. As noted in the introduction to this report, lands that would lie useless for long periods are instead put to productive purpose feeding animals. Similarly for agricultural by-products, which might otherwise largely go to waste. In return, animals manure, reseed, clear, and plow fields.

Furthermore, in the specific context of Usino agropastoralism, these feeding strategies help mitigate difficult spatial disjunctions. Stubble pasturing, in particular, means that daily droving to distant rangelands can be staved off for the first few months of the dry season, precisely when people most need to be near their fields for the harvest. At the same time, crop residues in the form of both field stubble and stored stovers serve as strategic dry-season feed supplements. Indeed, without such positive interactions as these, the great majority of Usino households would be unable to pursue their pastoralism at all.

Still, the low productivity of paleotechnic agriculture means it cannot generate sufficient pastoral resources of offset spatial disjunctions entirely. When puna pasturing becomes imperative, these disjunctions are much more acute. Then, the average nuclear family experiences especial strains in integrating pastoralism with other subsistence activities. In contrast, households enjoying direct access to greater-than-average labor reosources can to some degree escape these disjunctions by recourse to <u>estancia</u> or mixed pasturing. While such strategies allow for fuller exploitation of the punas -- and hence for

enchanced pastoral productivity -- they do so by largely divorcing cultivation and herding. At the same time, they introduce different problems of their own. Needless to say, practitioners of both the majority and of other pasturing patterns may turn to a variety of associational structures to help ease spatial/labor and other pastoral difficulties -- as publication No. 5 in this series (McCorkle 1982b) details. As that report also shows, however, such socio-organizational resources are not always readily available, are very small-scale, are sometimes quite costly, and are often themselves subject to considerable strain.

More broadly now, one larger outcome of dialectical conflicts in feeding practices is over-utilization[20] of intermediate zone lands plus under-utilization of high zone ranges of Usi. This has deleterious consequences for pastoralism and, indirectly, for agriculture as well. To enumerate rapidly, first, animals obviously suffer nutritionally. Second and closely related, as fallow land forage becomes excruciatingly depleted, the noxious loco husq'a takes over. Indeed, in many areas naught else may be left standing for hungry animals to consume. Increased pastoral losses to plant poisoning naturally ensue. Third, agricultural productivity likely suffers in the long run as well. In the intermediate zone, pastures = fields. And in Usi as in many other areas of the world (particularly mountain environments), these fields show signs of the well-known "erosion $\rightleftarrows$ grazing" syndrome.[21]

Fourth and finally, under-utilization of high-zone rangelands has negative consequences not only for immediate, but also future, pastoral productivity with respect to maintaining community control over this indispensible feed resource. Communities run the risk of losing de facto and even de jure rights to rangelands left empty or only partially grazed. For example, oral histories tell us that in [illegible] pure pastoralists from neighboring Pataq"iwar invaded a portion of Usi's punas. The interlopers set up permanent camp with their extensive herds, and drove off protesting Usinos with clubs and slingshots. The community retaliated by getting a juez de tierras, along with a small compliment of guardias de asalto, to ride up to the disputed area and warn the invaders away. Nothing came of this warning, however, and today Usinos are forced to share the area with Pataq"iwar. (Such altercations as these may also help explain Usinos' general wariness of the punas.)

This underutilization of the punas[22] calls for some additional comment because of its immediate implications for development. Fuller exploitation of these rangelands would at first glance seem a logical starting point for upping pastoral productivity in communities such as Usi. Seemingly, too, Usinos themselves would welcome such an effort, given the many benefits they assign to year-round puna pasturing. But before any such program could be considered, a number of issues would have to be confronted and resolved.

Minimally, for example, a way to make the punas safer in villagers' eyes would have to be found. While predator controls could be introduced, this simple expedient in turn raises a multitude of

potential problems of its own -- ideological, ecological, socio-organizational, technological, and even nutritional (see "Predators"). Likewise for protection against the threat, whether real or imagined, of murderous rustlers. This would almost certainly call for new forms of social action and organization -- forms which could easily prove too alien, time-consuming, disruptive, and etc., to be practicable.

Assuming such relatively straightforward issues as the above could be resolved, one primary problem still remains: how is labor for intensive puna herding to be recruited, retained, monitored, and justly recompensed? Whatever solution were proposed, it would likely entail creation of new roles, rules, and relations within, or even without, the indigenous community. Any such solution would probably imply large-scale aggregation of herds. This is turn would call for revised forms of pastoral associations with a more stable and enforceable structure than the simple, dyadic contracts now in effect. But such associations would further strain the ideal of household autarchy. Also, certain forms of more formal, inflexible contracts might prove unsuitable to the fluctuating Andean environment (both physical and social), and too costly for the smallholder stockowner (see McCorkle 1982b). The effects, positive or negative, of any such changes upon the larger integration of community social and economic life are difficult to predict, but would indubitably be far-reaching. Aside from these more "sociological" sorts of questions, naturally certain basic, ecological issues would also need to be addressed empirically. E.g. what is the pastoral carrying capacity of Usi's punas? Assuming villagers do under-utilize this resource how many additional head of each species could these rangelands in fact support without triggering irreversible damage to the delicate alpine environment?

Finally, given the dialectical interplay between agriculture and pastoralism in economies like Usi's, we can be sure that modifications in herding regimes will impact directly and indirectly, in anticipated and unanticipated ways, upon cultivation. To take but one example that comes immediately to mind, if herds are removed to the punas for large portions of the year, how will the loss of their manuring/clearing/reseeding/trampling services affect agricultural productivity?

Doubtless still further questions readily suggest themselves to the reader. The main point here, though, should be clear. Projects must consider well -- and holistically -- any action impacting so directly upon the very fabric of the organization of production as would modification of pasturing patterns. In contrast to other techniques examined here (e.g. docking, breeding), there are no clearcut directions for development in this aspect of indigenous animal management.

Certainly, considerable further study of the why and wherefore of extant pasturing regimes from a broadly interdisciplinary perspective is indicated. For example, an ideal future study (e.g. from a household-economy or a time-and-motion perspective) would be some empirical assessment of the comparative productive efficiency, for both cultivation and herding, of Usi's various pasturing patterns.

Reiterating the obvious, each regime has its advantages and disadvantages. Just as obviously, these are relative to a multitude of factors. To name but a few that come most readily to mind: as noted, household size; but also, of course, household age, sex, and kin compositon -- i.e. stage in the domestic life cycle --plus suprahousehold kin and/or political relations (Guillet, 1976); similarly, the size and composition of herds, especially vis-a-vis their "administrative" or "managerial" costs (what Horowitz 1979:42ff. terms "the carrying capacity to labor" see also Brownan 1974.)

Particularly intriguing is "all that walking" in the puna estancia regime. I.e. is it more "efficient" to move people, as versus animals, around in such a fashion? Are the extra labor and caloric outputs fully justified by increased pastoral productivity? In other words, emic decision-making processes behind opting for one pasturing regime over another (and more broadly, for household investment strategies in pastoralism as vs. agriculture) should also be elicited.

These and other such investigations would afford a much fuller understanding of indigenous range management upon which to base development action. Here, one can do little better than to echo Orlove when he writes of the Andean highlands that, with further study, many aspects of traditional cropping and grazing patterns often turn out to be more efficient and adaptive than they might at first appear. In consequence, planners must pay close attention to non-Western forms of social organization and land use before formulating and implementing any program of development (after Orlove 1976:209).

PART 2: NON-CYCLIC ASPECTS OF ANIMAL MANAGEMENT

Animal Structures and Equipment

As dialectical constraints dictate, structures and equipment pertaining to animal husbandry are few and simple in Usi. Structures are all made with locally and freely available materials that cost only the time and effort necessary to collect, process, and erect them. As usual, it is simplest to state at the outset what structures do not exist before proceeding to those which do. There are none of the following for herd animals in Usi: hay racks, mangers, feed troughs, mineral feeders, or self-feeders; chutes, creeps, runs, special pens; dipping and spraying structures or equipment; artificial watering facilities; and, of course, no stables. Sometimes, though, the precious cow is given a pen or shed of its own. Aside from a few rare or ancillary "other" sorts of structures, the principal animal husbandry constructions are only two: cercos 'fences' and canchas or canchones 'corrals'.

Fences. In Usi, the sturdiest fences are those of stone which border the major thoroughfares leading up from the valley floor. These are erected and maintained largely through communal labor, faena. Their aim is, naturally, to prevent animals from ravaging adjacent fields -- particularly the irrigated, yearly cropped chacras of the low zone. As one proceeds upwards along these byways to less traveled areas, stone gives way to adobe or q"ayara (a squat, palm-like cactus) or to no fencing at all. Thorn fencing -- the most quickly constructed but the weakest -- is also found. It is often used to protect newly-opened or temporary patches of kitchen garden. Adobe is the most common material where permanent enclosures are required, e.g. in bounding school and chapel grounds, household courtyards or patios, and permanent kitchen gardens. Fences (or corrals) of adobe may be topped with a layer of straw to prevent rain erosion. Sometimes, too, they are planted with a prickly cactus to discourage both human and animal invaders.

Only in the low agrolife zone are fences built "around" fields. Although Usinos' pasturing activities in this zone are limited, residents of the valley floor villages naturally do graze animals there. Since the low zone's rich, extensively irrigated lands are cropped once or even twice yearly, and since no communal control is exercised over planting or fallow schedules, fencing is imperative. Fortunately, though, it is also relatively feasible in terms of household labor. Usinos' maize-zone fields are tiny -- seldom more than half a masaq (the local term for topo, defined by informants as "a chacra of the size of one day's work"). As noted in "Feeding," stubble and grazing rights to low-zone fields are privatized. Fencing helps to protect these rights.

In the intermediate zone, fields are not fenced. Leaving aside the immense labor costs that fencing of these extensive lands would require, such a technique is manifestly infeasible in view of the rule and benefits of communal control in this zone. Muyuy fields are not fenced because gathering and grazing rights to them are not privatized.

Moreover, as Guillet (1981a) argues, communal control is essential to maintaining the reproductive potential of this zone. Orlove (1976) likewise suggests that privatization could result in serious ecological damage to this more delicate sub-puna environment. Guillet (pers. com.), citing Dahlman (1980), further notes that in such agropastoral systems as Usi's, stockowners must have access to large amounts of land to achieve any kind of optimal scale in herding. Communal control of open fields redounds to the benefit of all community members, not only with regard to economies of scale in grazing but also in manuring and transactional/managerial matters as well. In any case, the muyuy system itself serves much of the functions of fencing. By localizing all the area under cultivation at any one time, it reduces by many magnitudes the linear total of field perimeters that must be guarded from animals.

Corrals. Canchas or canchones constitute both the largest and the most universal animal structures in Usi. They also represent the greatest investment of time, labor, and upkeep in such constructions. Moreover, corrals and their valuable contents, uch"a 'ovine or camelid dung', enter into a variety of important economic exchanges, as we shall see.

Of necessity, permanent corrals are sturdy structures since they must be strong enough to resist the push and press of numbers of animals, among them the powerful llama. Village canchones are predominantly adobe with a stone foundation. Those at puna estancias are generally made of fieldstones. While strong and sturdy, Usino corrals are characteristically crowded and filthy. No bedding whatsoever is thrown down by any stockowner -- despite the free and ready availability of such materials as ich"u straws. And with the exception of the rare shade ("Other Structures," following), canchones are completely unsheltered. In protecting animals from the elements, they serve as little more than windbreaks.

All stockowning households must possess or have access to at minimum two corrals -- one, of course, for herds; the other, say villagers, "for potatoes." These two "types" of corrals are visually, structurally, and, on occasion, functionally (i.e. if wet-season corral rotation is practiced) identical; both are termed canchas. But while the purpose of one is to "keep animals in," the other serves to "keep animals out," i.e. out of a major food processing and storage area. During harvest-time and after, tubers are stored in the "potato corral," and the stalks of habas and grains are left there to dry until ready for threshing. The lengthy process of ch'uñu-making (freeze-drying potatoes) also takes place here, beginning in May-June and continuing through August. Ch'uñu production requires a large, cleared area where the tubers can be protected from trampling or consumption by animals (and theft by humans) while they are laid out upon the ground to undergo the repetitive cycle of freezing and drying.

Aside from keeping animals "in" or "out," corrals serve another primary function -- that of manure collection and storage. The importance of herd-animal dung to Andean subsistence cannot be overstated. As usual, lexical elaboration alone tells us as much. In

Usi, I elicited four distinct categories of excrement, depending upon the species. As noted, uch"a refers solely to ovine and camelid droppings. For cattle, the term is q'awa, and for humans aka. For wild animals and, as nearly as I could determine, all other species, the word is simply wanu (Spanish or English guano).

It is little wonder that excreta receive such linguistic attention in Quechua. Dung is, of course, the principal source of fuel in this nearly tree-less region; and its critical role as fertilizer has already been thoroughly documented. (For a full appreciation of dung as an essential resource in the Andes, see Thomas 1973 and Winterhalder et al. 1974). Here, I will merely note that, as villagers so succinctly put it, "Without uch"a, we would have no potatoes."

Across the year, the dung of all herd animals accumulates in the corrals. One informant estimates that an average-sized Usino herd deposits 100-150 costales 'gunny sacks' of uch"a per year in their owners' canchones. One costal equals roughly a hundred pounds of manure. (However, if Thomas' 1973 calculations in Nunoa can be assumed to hold even approximately for Usi, then this 100-costal figure seems rather overblown.)

When the dry season begins, the accumulated manure is periodically (two to three times between May and August) scraped up into piles around the perimeters of the corrals, where the kitchen stove ashes, too, are collected. In August-September, these materials are sacked up and transported by llama to the year's potato fields. A portion of uch"a is placed in a corner of each chacra, ready at hand for the November planting. Usinos say they may spread some of the manure on the newly plowed fields, but they are always careful to bury a handful of uch"a with every few seed potatoes as well. One informant estimates that some 20-25 sacks of dung are required for each masaq of potatoes.

Depending upon household size, some four to seven costales of uch"a per year must also be set aside for the family cookfire. While Usinos view llama and sheep manure as equally good fertilizers, they prefer bovine and camelid dung for cooking. Some informants say the latter burns best, but others disagree, noting that cattle q'awa burns more slowly and evenly. However, all agree that sheep manure is the least suitable for the kitchen both because it burns more poorly and "because it falls apart too easily" and therefore is inconvenient to handle.[23] (Burro and horse droppings are also employed as combustibles, but these animals are so very few in Usi that their role in providing fuel and fertilizer is small.)

Winterhalder et al. (1974:101) calculate that 40% of Andean herd animals' manure production is deposited in corrals. In Usi, as elsewhere, this figure is supplemented by almost daily gathering in the countryside of camelid droppings for fuel. The instinctive camelid utilization of common defecation grounds greatly facilitates collection. Children and adults alike perform this chore in Usi, both as an adjunct to other activities and on foraging trips specifically for the purpose. McRae (1979:64) estimates that such foraging raises the direct recovery of dung to 60%. Most of the remainder falls onto

fallowing plots. In short, little of this essential resource is lost. Interestingly, Winterhalder et al. calculate that the Andean family must have access to, or maintain, a minimum of 25 (adult) sheep to meet their yearly manure requirements for field and kitchen -- strikingly close to the average Usino flock size of 26.8.

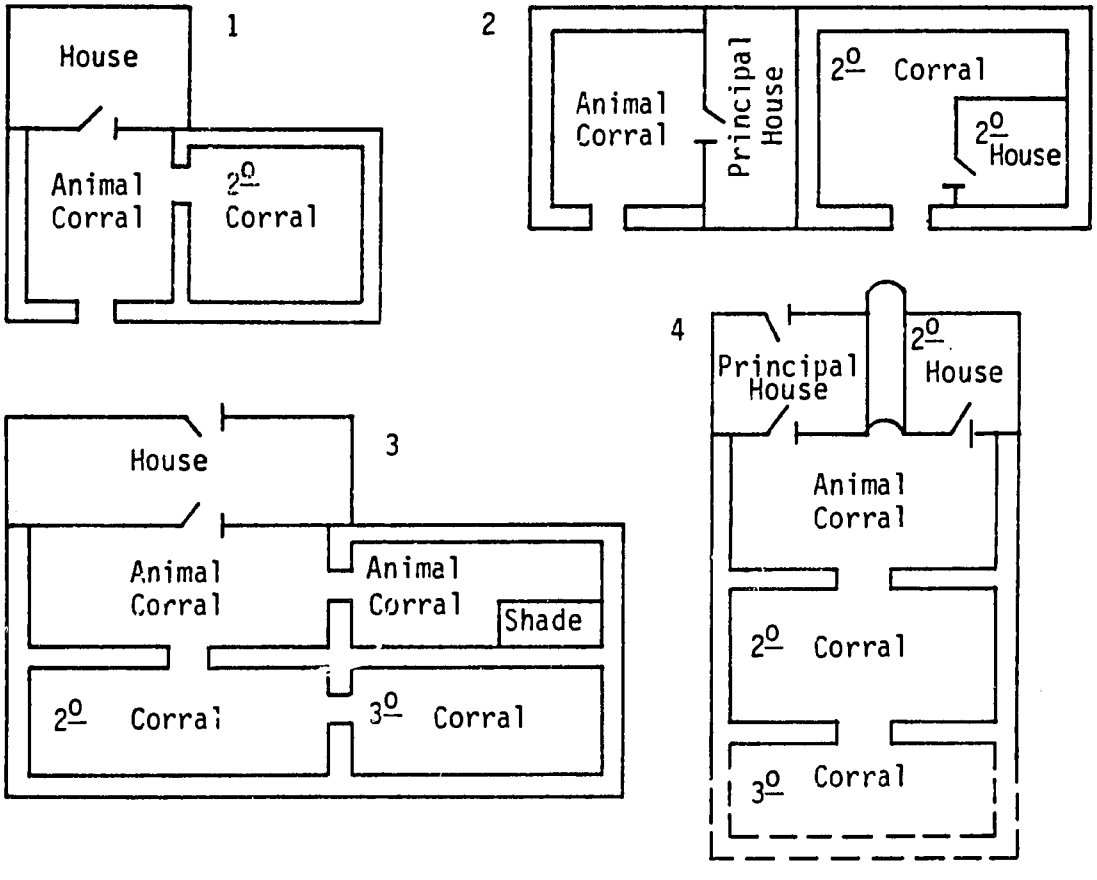
Of course, some families possess more animals, and some fewer. When this fact is coupled with the critical importance of uch"a to household subsistence, it is hardly surprising that dung is a valuable item of economic and social exchange within the village. Although it never figures in exchanges involving cash or foodstuffs, it can be traded for access to land, labor, or corrals. For example, muyuy fields can be rented with uch"a, at a "price" of 50-70 costales per topo a year. With regard to labor, one day's work earns five sacks of manure (a figure which informants say has never fluctuated). And a corral can be "borrowed" in exchange for all the uch"a deposited by a herd during its stay there. Finally, cooking quality dung in small quantities is an item of constant goodwill exchanges "gratis" among friends, neighbors, and kin.

As noted earlier, at least two corrals are minimally necessary for the Usino family to pursue both its pastoralism and its agriculture. But many households have more. It is not uncommon for a house to have three, or sometimes four, canchas attached to it (see Figure 5). Moreover, through marriage a couple may come to own two houses in the village and hence four, five, six, or more corrals. Conversely, a family which has lost all, or nearly all, their herd may possess unused corrals. Whatever the reason, however, these facilities do not stand idle. The "extra" canchones are utilized in any of a variety of ways.

Stockowners with a "large" herd of camelids (five or more) prefer to bed them separately from ovines. This separation is made for a number of reasons (recall "Breeding"), e.g.: llama can trample young sheep to death, cause ovine abortions or deaths in the press of the corral, or simply injure "innocent bystander" sheep in the course of a fracas among themselves. Invariably, cattle, too, are quartered separately -- not so much for the protection of other species but rather to forestall any possibility of accident to this most costly of all domesticates.

Alternatively, along with the potato canchon, extra corrals may be employed in a rotational system. Midway through the rainy season, after months of unending downpour, corrals become reeking bogs of ordure. At that point, if other canchas are available, herds may be shifted to these relatively cleaner, dryer quarters. Shortly after the rains cease, the animals are returned to their original corrals. By that time, say villagers, these have had time to dry out and "disinfect" themselves somewhat. These moves are designed to discourage a variety of diseases which Usinos believe arise from the mud and excrement of rainy-season canchas. Specifically, stockowners mention "turning sickness" and the dreaded diarrhea, plus the fact that "the animals' hooves begin to rot and swell." Villagers are correct in their assessment that rainy-season corrals are unhealthy, since all

FIGURE 5
EXAMPLES OF TYPICAL HOUSE AND CORRAL ARRANGEMENTS



Comments on Figure

As a general note, Usiños prefer to bed their animals right outside the door of their principal house--where the herd can be constantly observed and the threat of theft or predation thereby minimized. (Secondary houses are generally used for storage and/or may accommodate extra household members, e.g., a married son or daughter.)

No. 1 above represents the most minimal complex of structures to be seen in Usi. In all these examples, the secondary canchon (and tertiary, if one exists) can be utilized as separate quarters for a second species (llama, or cattle and burros), as a "potato corral," as a huerta (kitchen garden), or as a combination of the latter two. If the household possesses a number of camelids, cattle, or burros, it will likely opt to use the secondary corral to separate these larger species from ovines. In such cases, of course, the family must seek kitchen-garden and potato-corral locales elsewhere.

Like No. 1, example 2 is a common arrangement among families with few animals. The secondary cancha does double duty as both huerta and potato corral. No. 3 represents a truly fortunate household with ample quarters for at least one other species besides ovines. If all three groups of animals are present (sheep, camelid, cattle/burro/horse), the family may quarter herds in the secondary corral as well.

manner of parasites and other disease agents indeed do flourish in wet and filth (McCorkle 1982a).

Corral rotation addresses another threat, too -- that of neonate and, for sheep, even adult drownings in the quicksand-like muck. This is a very real danger, as village anecdotes detail[24] and as any researcher who has ever slogged through the stuff can attest. A final advantage to corral rotation, say stockowners, is that it diminishes the buildup of chaqcha, boluses of hardened mud and dung, on the fleece. Usinos complain that it is a great nuisance to have to pick out all the chaqcha at shearing time.

There is yet a third option for truly "spare" canchones -- rental. If let out for animal quarters, a corral can be a valuable asset since, as noted earlier, the rental fee consists of all the manure deposited there. Stockowners generally seek additional canchones for their animals for either of two reasons. One is to enjoy the corral rotation benefits described above. In this case, the rental arrangement usually involves the latter half of the rainy season. A second reason for corral rental is stockowners' wish to quarter their herds closer to their chacras during puquy (ripening of the crops in February-March) or harvest (April-May-June) when labor is at an all-time premium and when, to ward against theft, family members must go often to q"away (here, 'check on'), or to sleep out in, their fields.

Rental of canchones for use as "potato corrals" during ch'unu processing is less remunerative, but perhaps more common. Usually the corral owner requests only one or two day's work in exchange for the May-to-August "lease." Sometimes she/he asks no payment at all, instead preferring to reap the social obligations and goodwill thus sown. For this usage, rentees try to locate a suitable corral as close to their house as possible -- again, because of fear of theft. If the corral is not within convenient q"away distance, then some family member must go to sleep there nightly.

One final note now regarding corral usage. I fully expected Usinos to report that, as in the neighboring province of Espinar (Orlove 1977b), they rotate corrals between agricultural and pastoral uses every few years in order to take advantage of the enriched soils. With very few exceptions, however, villagers state they do not. One reason tendered was that crops, particularly potatoes, grow very poorly in such plots. "They produce leaves, nothing more." In a personal communication, researcher Johannes van Vugt hypothesizes that this observation may reflect the fact that the pH balance of soils which are over-fertilized with animals manure can become seriously disturbed. Still, this does not explain why the people of Espinar and Usi -- so very similar in economic and ecological circumstance -- should differ on this point. I rather suspect that, in Usi's case, there simply are not many corrals standing idle long enough to be employed for cropping.

Other Structures. A handful of villagers include within their corrals a place for stock to shade up from the dangerous calor 'heat'. They may erect a small, open-walled shed -- essentially just four posts with crossbars overlain with straw. According to Ensminger (1970:418),

however, this is the ideal design for shades since it allows for thorough drying of collected urine and feces, and for proper ventilation. These structures are built primarily for sheep, since this species in particular is prone to photosensitization disorders in the Andes. Such shelters provide no effective protection from the elements other than the sun, though.

Aside from these shades and the structures already discussed, the only others relating even indirectly to animal husbandry concern storage of fodders and cookfire manure. Fodder storage takes various forms in Usi. Some people merely toss the habas stalks and cereal straws into a corner of their potato corral or kitchen garden. Since all fodders are collected at the beginning of the dry season and are utilized before it ends, this is in fact a perfectly feasible method of storage. Still, the more common practice is to warehouse these materials within some sort of structure. This may be a small hut, either temporary or permanent, of sticks and ich"u. Such huts are generally located in the corner of a canchon. Alternatively, fodders may be kept in a room of the family's principal dwelling or in a secondary house used for general storage of agricultural products, implements, and whatnot. Challa, maize stalks, often receives special treatment, however. It may be stacked on the balcony of a two-story house; wedged into the branches of a handy tree, well above the reach of hungry stock; or piled on a qulqa, a high platform constructed specifically for storing this valuable dry-season resource. Finally, families short on warehousing space may solicit the use of an empty hut or house from a neighbor or relative. No rental fees are entailed thereby.

Along with a few sticks of firewood, dung for kitchen use may also be stored in a tiny hut in the corner of a corral or patio. The hut protects these combustibles from the rain and from trampling by animals. Some people instead construct a p"irwa of cooking manure. This peculiar "structure" consists of a carefully stacked little "corral" (about 1m in diameter) of q'awa 'cattle droppings', its center filled with uch"a. This makes for convenient storage of combustibles since the unit is erected inside the house, right by the stove. Alternatively, a sack of manure may simply be leaned against the wall next to the cookfire. Whether these different storage options constitute "animal-related structures," however, I leave to the reader's discretion.

Equipment. As with structures, animal-related equipment is simple and limited to but a few items. As noted in "Shearing," knives and tin cans are the only clipping instruments. Ropes, of course, are also necessary to bind the animal being sheared. Additionally, ropes, wask"a, and large gunny sacks, costales, both woven of llama fiber, are crucial items in transport. Finally, slingshots, waraka, and stones are useful in driving herds and in warding off predators.

In the latter regard, dogs could also be counted as animal-related "equipment." Although they do not aid in herding itself, they accompany the shepherd/ess in daily pasturing to sound the alarm at, and warn off, approaching predators. Occasionally, village hounds even

succeed in killing the odd fox or two (see "Predators"). They have the additional night-time function of guarding corralled herds, not only from predators but also from would-be thieves. Not every stockowner keeps dogs, however. They are fairly costly to maintain and compete with humans for foodstuffs. But households with larger-than-average herds generally do own a dog. For them, the cost/benefit ratio is more favorable.

Other animal-related items include the ritual paraphernalia requisite to the protective and reproductive rites for herds (recall "T'inka") and the folk pharmacopoeia for curing animal ills (McCorkle 1982a).

Summarizing now, just as we saw for "Feeding," even such concrete aspects of peasant animal management as structures and equipment attest to the workings -- both complementary and competing -- of the agropastoral dialectic. As noted in the introduction to this report, the low productivity of paleotechnic agriculture means that animals must be ranged, not stabled. But rangestock operation, while solving one problem of integration, introduces other disjunctions between the two subsistence systems -- again, both in space and time.

Spatially, the contiguity of fields and pastures can make for problems of herd control. Usinos address these potential problems with a variety of strategies. One is, of course, near-constant supervision of animals (i.e. more labor input). More to the point here, though, is the presence of fencing in the low zone and its absence in the intermediate zone, where the sectoral fallow system takes its place. These differing modes of integration once again exemplify the complexity of the interrelationships between peasant pastoralism and agriculture. The exigencies of their simultaneous pursuit directly condition the form and functioning of each in those zones where they co-exist.

The extent of the dialectical link betwen cultivation and herding is further illustrated in village corral usage. Canchones -- the pastoral structures sine qua non in Usi -- also serve an immediate agricultural function as collection points and warehousing stations for the fertilizer so imperative to successful tuber production. Indeed, use of animal manure as fertilizer constitutes the classic example of complementarity between cultivation and herding. This complementarity is ecological as well as technological. Pastoralism makes the resources of the extensive puna ecosystem available to the intensive agriculture of the intermediate zone. Herd animals gather, transport, and, via their ruminant capabilities, transform puna resources which would otherwise be lost to human use into fertilizer and fuel. Corrals facilitate collection of these valuable products.

However, in both subsistence realms, village corrals fulfill their roles only imperfectly. This is evidenced in the issue of bedding. Failure to exploit this simple technique naturally has direct, negative consequences for animal health, comfort, and safety. But it also impacts negatively upon agricultural productivity because lack of bedding works against the effective collection and preservation of

nutriments in animal excreta. Specifically, bedding serves to soak up urine -- which contains roughly half the plant food value of manure (Ensminger 1970:350). It is also important to conserve the urine because its nutrients are more readily available to plants than those in solid wastes (op. cit.:355). Moreover, bedding fixes a number of these chemicals in relatively insoluble forms, thereby protecting against losses by leaching. As a minor point, it also allows for easier handling of manure.

Despite these advantages, both pastoral and agricultural, Usinos do not bed their corrals. Why? For one, the low productivity of paleotechnic agriculture affords no surplus materials for this purpose. For another the labor-intensiveness of paleotechnic cultivation, plus that of the rangestock operations it dictates, apparently leaves villagers no time even to gather naturally occurring grasses for bedding.

Time seems to be a factor, too, in Usinos' failure to systematically clean and/or disinfect corrals. The only action taken by all villagers in this regard -- albeit with an agricultural rather than a pastoral end in view -- is the annual removal of manure to the potato fields during the dry season. Beyond this, as noted earlier, some stockowners endeavor to rotate their herds to fresh canchones midway through the rainy season -- when, indeed, sanitary measures are most needful. But thanks to a general corral shortage in Usi, relatively few people are able to follow this practice. Moreover, it is questionable just how much benefit this one-time-only rotation produces.

In short, the general paucity, simplicity, and inadequacy of pastoral structures and equipment in Usi largely reflect the competing demands that simultaneous cultivation and herding place upon the peasant household's scarce agricultural, financial, and labor resources. The implications of these dialectic constraints for even the most simple and obvious of pastoral development actions -- like improving corral sanitation -- must be carefully considered before launching any extension program.

Herd Composition, Losses, And Culls

This section describes the composition of Indians' herds by species; then for ovines and camelids, by sex and age. Second, it examines loss rates and culling practices for these animals in Usi. Both topics are discussed within the context of the agropastoral dialectic, plus other salient issues in the study of peasant animal husbandry -- e.g. multiple species management, conservatism in household consumption and sales patterns, overstocking and overgrazing.

The data for these two topics are drawn respectively from the synchronic and diachronic herd censuses, applied to a 30% stratified sample (N=27) of the community's stockowning households. Data are analyzed both in the aggregate and, where pertinent, by sample category as well. The four categories, stratified according to numbers of sheep

owned per household are: I 1-10, II 11-25, III 26-50, and IV 50+ ovines. This was taken as the basis of stratification since sheep production obviously forms the backbone of Usino pastoralism. In consequence, however, the camelid data are somewhat slim (within the sample, for camelid-owning households N=17) and epiphenomenal. Their analysis is therefore limited to only the most unmistakable trends. Any other interpretations of this information must be viewed as tentative.[25]

Herd Composition by Species. Herd composition from the point of view of species is important because, as noted both in "Pasturing Patterns" and in the introduction to publication no. 5's "Labor Organization Strategies," maintaining species variety has advantages similar to those of intercropping and raising a range of plant domesticates. Ruminants naturally differ in their disease and climate tolerances, breeding rates, forage and water requirements, supervision needs, and so forth. Such variation plays an important role in risk reduction and in maximizing returns from herding. For example, different breeding rates mean that, after a pastoral crisis, at least one species may be able to recover rapidly. Mixed grazing also lessens pressure on rangelands and makes for their more productive exploitation since different species prefer different forages. It can also therefore reduce losses to plant poisoning (cf. McCorkle 1982a).

Table 4 presents the average number of each ruminant species kept by stockowning households in the four sample categories. These figures are based upon thoroughly accurate raw counts of animals. For each household sampled, herds were personally observed, counted, and re-counted at least once by the researcher conducting the interview. Sometimes, this entailed surreptitious return visits to the household in question, at dawn or dusk, to climb up corral walls or peer through canchón gates. I emphasized this counting and re-counting in my research because informant testimony alone cannot always be trusted. As West (1981:4) quite correctly observes, the reluctance of peasants to state herd sizes to outsiders is legendary in the Andes. Indeed, a principal criterion in selecting households for inteviewing was that herds be available for first-hand counting so that under-reporting could be forestalled.

As the table indicates, based on the stratified sample, stockowning households in Usi average 26.8 ovines, 5.2 camelids (almost all llama), and 1.3 bovines. The household medians for ovines and camelids roughly parallel the average: 21 and 4, respectively. For bovines, however, the median is zero. This is because less than 50% of all stockowning families keep cattle, making for a rough figure of two to three head per cattle-owning household. As noted throughout this and other SR-CRSP reports, in the context of a vertical ecology and a scarcity of household labor, cattle pose some special management problems. In consequence, an "economy of scale," as it were, is at work in cattle-raising.

Looking next at within-group differences in Table 4, these suggest a rough, but not unexpected, progression: as households become richer in ovines, they tend to raise more camelids as well. Bovines, however,

TABLE 4 :

HERD COMPOSITION BY SPECIES AMONG HOUSEHOLDS SAMPLED

	OVINES		CAMELIDS		BOVINES	
	Average	Range	Average	Range	Average	Range
I	8	6-10	1	0-4	.9	0-4
II	18.8	13-25	6.4	0-18	1.3	0-3
III	32.2	27-39	4.6	0-13	2.2	0-5
IV	63.8	52-71	9.2	6-13	1.3	0-4
	26.8*		5.2*		1.3*	

*Composite average per stockowning household based on the sample raw counts and combining all four household categories.

do not follow this pattern. The explanation is simple. Sheep and llama lend themselves reasonably well to joint herding. They can graze the same muyuy and puna locales, and survive on the naturally occurring forages of these zones. Although this management practice is not entirely ideal -- either in animal scientists' or Usinos' eyes -- it obviously saves on household labor. Moreover, it enjoys the advantages of mixed grazing cited above, plus others such as greater protection for the dull-witted ovine thanks to its llama herdmates (see "Management of Predation").

In contrast to camelids and ovines, bovines suffer more from the cold, altitude, and relatively poorer pasturage of muyuy and puna. They generally require richer forages "lower down." Given that cattle are a major and already risky investment for the Usino household, owners make every effort to accommodate these precious animals. In short, cattle raising is essentially a separate pastoral enterprise. Needless to say, it is also therefore a very costly one in terms of labor. People who own cattle as well as sheep and llama must either double their herding workforce or make some sort of caretaking arrangement with another household (McCorkle 1982b). As we saw in "Foddering," cooperative arrangements must also be made for keeping cattle adequately fed through the difficult dry season.

Dialectically then, cattle are something of a mixed blessing in the species diversification strategy. Along with several of the same products and services other herd animals provide (e.g. dung, clearing/reseeding/trampling), cattle offer additional ones such as power for traction or a bit of milk for sale. Their role in low-zone plowing is an obvious complement to agriculture. Yet in this same zone, cattle are in more direct competition with humans -- unlike sheep and llama, which can survive on the community's non-arable marginal lands and the fallowing muyuy. Also, grazing right alongside the richer, yearly cropped fields of the lower areas, cattle -- the largest and hungriest of ruminants in Usi -- pose a much greater danger to ripening crops.

In sum, maintenance of herd diversity often demands the sacrifice of some efficiency. At the very least, as noted throughout this report, herding two or more species is much more complicated and demanding than herding one alone. Yet despite the attendant technical and organizational problems -- and likely lowered overall herd efficiency as a result -- peasants strive to manage different species simultaneously. They do so because this strategy reduces risk by diversifying the economic base of the domestic unit -- a requisite of success in a generalized mountain procurement system. Dialectically, herd diversification is also important for agriculture. E.g., if drought wipes out crops and, with them, one or another animal domesticate, one species may yet survive to produce dung for fertilizer and cash for seed purchases with which to renew planting.

Herd Composition by Sex. As McRae (1979:24) observes, "Little is known of the age-sex structure in campesino herds, and what is reported is usually for camelids and is generally not consistent or comparable." The data presented for Indians' flocks of sheep in this and the

following subsection should therefore be of particular interest. Sex and age compositions are important because, along with culling practices, they tell us much about management strategies and goals. And, beyond sheer size of holdings, they serve as sensitive indicators of household economic status in animal husbandry because they signal whether pastoral fortunes are stable, on the rise, or under strain. For example, a herd with few females or one composed of half newborns is at greater risk; an abnormally low proportion of males and castrates may indicate that a family has been forced to draw heavily upon its reserves of pastoral wealth; and so forth.

Tables 5 and 6 following present the averages and ranges for the sex of herds by species for each sample category. I should caution the reader that these data, along with those for animal ages, are perforce based solely upon informant testimony. Short of direct sexual examination of every animal in each household herd -- a task for which there was neither the time nor the inclination -- there was no way to cross-check this information. And, while animal ages can be roughly determined from dentition, peering into the mouths of 724 sheep and 140 camelids (the sample totals) was likewise unfeasible.

Examining the composite averages in Table 5, we see that Usinos are maintaining rams, wethers, and ewes in a rough proportion of 3:1:9. These quantitative data clearly corroborate villagers' qualitative claim that, for the obvious reproductive reason, they attempt to keep a high proportion of ewes in their flocks. In any pastoral enterprise, the female animals constitute the capital. The percentage of ewes in a flock determines its productivity and resilience. It is noteworthy that, with only one exception, no household in the sample keeps fewer than 50% of its flock in ewes. And, while the aggregate norm is 68%, 33% of the sample keep 75% ewes or more. In this aspect of animal management, Usinos are clearly perfectly rational by any standards.

The quantitative data of Table 5 yield one anomaly, however. Despite villagers' stated ideal of generally maintaining only one or two rams per family flock, people in fact do not appear to bother much about castrating sheep -- or at least not in the ethnographic present. Across the sample as a whole, households keep only 7% of their flock in wethers; and only 21% of all rams are castrated. By contrast to the foregoing data on ewes, this aspect of Usino management may at first glance seem somewhat less than rational, given the many benefits of castration (i.e. increased size, hardiness, and docility). Indeed, there is perhaps some element of the "irrational" (or more accurately, the uninformed) here, in that Usinos mistakenly link these benefits with docking instead. However, as detailed in "Castration," there are also quite "rational" reasons, grounded both in the agropastoral dialectic and in ovine maladaptation to the Andes, for "leaving well enough alone" when it comes to castrating sheep -- especially in an epidemic year (see "Losses").

Camelid herds (here, almost exclusively llama) present a dramatically different sex structure. As Table 6 shows, household herds average nearly 50% castrates (although this figure ranges from a low of 0% in two instances, to a high of 100% in four cases). Despite

TABLE 5

SEX COMPOSITION OF HOUSEHOLD FLOCKS OF SHEEP

	RAMS			WETHERS			EWES		
	Average	Range	Average % of Flock	Average	Range	Average % of Flock	Average	Range	Average % of Flock
I	2.6	1-5	32%	.1	0-1	2%	5.3	3-8	66%
II	5.1	1-8	27%	1.1	0-4	6%	12.6	7-17	67%
III	7.8	6-9	24%	1.8	0-5	6%	22.6	18-30	70%
IV	15.4	9-22	24%	5.8	5-10	9%	42.6	30-51	67%
*Composite Average Per Household			6.6			1.9			18.1
*Composite Average % of Household Flock			25%			7%			68%

*Based on the sample raw counts and combining all four household categories.

TABLE 6

SEX COMPOSITION OF HOUSEHOLD HERDS OF CAMELIDS*

	MALES			CASTRATES			FEMALES		
	Average	Range	Average % of Herd	Average	Range	Average % of Herd	Average	Range	Average % of Herd
I	0.0	0-0	0%	2.5	2-3	71%	1.0	0-2	29%
II**	2.3	0-6	29%	3.0	0-9	38%	2.6	0-6	33%
III	1.6	0-4	22%	2.3	0-4	30%	3.6	0-9	48%
IV	1.8	0-5	20%	6.0	4-8	65%	1.4	0-4	15%
*Composite Average Per Household			1.6			3.5			2.1
*Composite Average % of Household Flock			23%			48%			29%

*Based on the sample raw counts and combining all four household categories. Only those households possessing a herd of camelids are included here.

**In this category, eight alpaca kept at a puna estancia by one household are omitted due to lack of data on these animals.

the derivative nature of the camelid data, the trend of Table 6 is unmistakable, and clearly corroborates villagers' qualitative testimony. Transport is the prime reason for keeping camelids (i.e. llama) in Usi. And given stockowners' claims of the many ways in which castration improves carga performance, the ratio of castrates to females and studs comes as little surprise.

Herd Composition by Age. Table 7 presents the age distribution of household flocks of sheep averaged across the full sample. Within group figures are not presented here, or for camelids, since they largely parallel the full sample figures.

Table 7: Age Composition of Household Flocks of Sheep

	0-3 mos.	3 mos.-1 yr.	1-4 yrs.	4+ yrs.
Composite Average	1.2	4.3	11.0	10.3
Average Percentage of Household Flock*	4%	16%	41%	38%

*Percentages sum to only 99 due to rounding.

Two facts are of note in Table 7. First is the very low proportion of neonates -- lambs aged 0-3 months. They constitute a mere 4% of family flocks. As noted throughout this report, thanks to factors such as poor health and nutrition, sexual maturity is delayed, fertility rates are low, and abortions are frequent among Usi's criollo sheep. Moreover, neonate mortality levels are high due to general ovine maladaptations in the Andes (such as ewes dropping their young at night and/or during the cold, dry season; recall "Breeding"), coupled with the numerous hazards to ovine life and limb which peasant management strategies address only imperfectly (e.g. disease, flooded and crowded corrals, predators; see relevant sections). Neonate mortalities rise even higher when droughts, heavy frosts, and epidemics strike -- as they did during the past eithnographic year (see "Losses").

Second, at the other extreme of the age spectrum, there is an exceptionally high proportion of oldsters (4+ years). Exceptional, that is, by comparison with commercial sheep operations -- where, in meat and wool enterprises respectively, non-breeding stock are culled as soon as they reach optimal weight gain or when they have passed their fiber-producing peak. Here, then, are peasants demonstrating "true irrationality" by maintaining disproportionately large numbers of animals past their productive prime? The answer is, of course, "no"; and the key word here is "productive."

The bases for this negative answer are twofold. First, recall that, particularly under the rigors of peasant management, the Andean criollo reaches sexual maturity, full adult weight, and appreciable wool growth quite late. For example, as noted in "Castration," ewes

seldom reproduce before age two, and often not until age three. West (pers. com.) confirms my observation that Indians' undernourished criollos typically reach adult weight only between age 3-4. Likewise, as remarked in "Shearing," informants say fleece growth among village ovines generally does not justify shearing until this age. In short, relative to their delayed cycle of development, sheep in Usi do not reach any sort of "productive prime" until around age three.

Second, coupled with these basic physiological considerations, there are sound socioeconomic reasons for maintaining older sheep. These largely center on the different emphases in production for maximization of profit from market sales, as versus production for subsistence -- a subsistence grounded in agriculture as well as pastoralism. The multiple functions of livestock within such subsistence systems figure directly in this issue of maintaining aged animals -- as do, also, relationships between the peasant subsistence system and the larger money economy.

One of the main functions of livestock in the peasant household economy is "cash-getting." But in contrast to agriculture's daily "checking account," animals constitute the family "savings account." Other than for general replacement fund needs (Wolf 1966), savings are usually dipped into only when crises (e.g. crop failure, medical emergencies, juridical or other ethnic dominical pressures) or special (usually ritual) events calling for exceptional outlays in money and/or meat arise (see "Culls"). This represents eminently rational restraint on the part of the peasant pastoralist. Herds offer one of the very few investment options open to Indians. Older sheep in particular constitute a relatively safe investment; after one year of age, ovine mortalities in the Andes reportedly drop to 3%-5% under normal circumstances -- as versus 18% at age 0-3 months, and 15% among 3-month- to one-year-olds (McDowell pers. com., in McRae 1979:123).

In view of the rampant inflation in Peru[26] and Indians' lack of alternative avenues of investment, converting livestock to cash when there is no immediate need for money is patently foolish. The value of the cash erodes more rapidly than that of the animal. Ceteris paribus, once a sheep has reached it full adult weight, its value on the commercial meat market declines little for the next few years. In the meantime, these older animals continue to produce the precious manure so necessary to successful highland agriculture. Recall from "Corrals" that, if Thomas' (1973) Nunoa estimates are even roughly applicable to Usi, a household cannot allow its flock to fall much below 25 mature sheep and remain self-sufficient in dung. Moreover, aged animals still yield much-needed wool, albeit in diminishing quality and quantity. And, as noted earlier, a mature herd is at less risk than one composed of disproportionate numbers of juveniles. Relatedly, if we examine the sex composition of this 4+ year group, we find that 74% are ewes. I.e. peasants are wisely hoarding their pastoral "capital" in hopes of continued reproductivity and flock resiliency. Finally, it is doubtful that immature animals would generate as much manure or fiber as an equal number of adults. Additionally, for these same reasons, plus storage and over-supply problems, converting animals at maturity to

meat for household consumption is just as unwise as converting them to cash on an untimely or excessive basis.

In contrast to the age data on sheep, those for camelids would seem to indicate that there are relatively few elderly llama and alpaca in Usi. As Table 8 below indicates, in this sampling the majority clustered in the two-to-six year age range. Yet the rationales for maintaining aged sheep apply equally well to camelids. Moreover, loss rates among camelids are low; and Usinos almost never cull these costly creatures (see following subsections). In fact, a number of other villagers I spoke with who were not included in the stratified sample reported owning llama as old as 15-20 years. In sum, I suspect that Table 8's figures result from a skewed sampling of camelids. Certainly, though, the households represented here are quite fortunate. According to villagers, llama are at their reproductive and functional peak between age 3-5.

Table 8: Age Composition of Household Herds of Camelids*

	0-6 mos.	6 mos.-2 yrs.	2-6 yrs.	6+ yrs.
Composite Average	.8	1.0	4.6	1.3
Average Percentage of Household Herd*	11%	13%	59%	17%

*Based on the sample raw counts. Only those households possessing a herd of camelids are included here. Eight alpaca for which age and sex data were unavailable are omitted.

In any case, "hanging on to" aged animals makes good sense from the point of view of the peasant household for a number of reasons. However, this practice raises questions of overstocking and, under a system of communal pasturage, of overgrazing at the aggregate level. These issues are addressed at the conclusion of this section.

Losses. Losses are here defined, in distinction to culls, as non-purposive livestock deaths. In Usi, losses can result from a wide variety of causes: disease, predation, exposure, theft, accidents of all sorts, and even old age! In the diachronic herd census upon which this and the following subsection are based, some of these causes remained "empty cells" across the households sampled for the one-year period surveyed. Only the losses attested during this period are examined here. Others reported during administration of the diachronic herd census for times past are incorporated in anecdotal form into relevant sections throughout this and other reports in this series.

Turning first to ovine losses, the aggregate average per household for the year surveyed was 7.3 sheep. This constitutes a hefty loss rate of 21% of the average family flock of 35.4 as of one year ago. Naturally, some people fared better than others, and this figure varied from a low of 7% to a high of 71% across the sample. Only three of the

27 households reported no losses across the past ethnographic year. Table 9 below presents a synopsis of these data. Within groups, loss rates were highest in category I, where households averaged a 38% annual flock loss. This figure is followed by II's 25%. Category III averaged the lowest, at 13%, with IV not too far different at 16%.

Table 9. Annual Percentage of Household Flock Losses

	Percent of Flock Lost Across Year Sampled					
	0%	1-10%	11-20%	21-30%	31-40%	40+%
No. of Households	3	2	6	8	6	2
% of Households*	11%	7%	22%	30%	22%	7%

*Percentages sum to only 99 due to rounding.

Naturally, birth rates can serve to offset such losses. But in Usi, households averaged only two surviving ovine births (range 0-10) across the period sampled. When culls are taken into account -- an annual average of 3.6 per household -- it is clear that, at least for the year surveyed, most Usinos lost considerable ground in their oviniculture. Indeed, only one of the families interviewed reported a gain of (18%) in flock size across the year, and only one other managed a net equilibrium. Overall, including births and culls, household flocks dwindled by precisely a fourth from March 1979 to March 1980.

Even given ovine alienage in the Andes and the rigors of peasants' management, an average loss rate of 21% calls for some explanation. In fact, at least two, somewhat exceptional, phenomena were at work during the period surveyed. First, this was a drought year in the region. The rains came late and, when they did arrive, were sparse. Since agricultural byproduct fodders are exhausted early on, scarce forage after an extended dry season means that ovine death rates climb -- particularly among neonates and juveniles. As noted earlier, mortalilty levels for Andean sheep in the first three months of life have been calculated at 18%; between three months and one year of age, they are still 15% (McDowell pers. com., in McRae 1979:123). But during years of drought and/or heavy frosts (the two usually co-occur) neonate mortality may reportedly rise to over 50% among peasants' flocks (Custred 1973a, cited in Orlove 1976:212).

Indeed, among the 198 losses reported in the total sample, 101 or 51% fell in the 0-1- year age group. While 55 of these resulted from predation and two from accident or straying (see below), the remaining 46 losses in this age group (23% of <u>all</u> losses) can be assumed to reflect the effects of a drought year -- either directly, or indirectly insofar as poor nutrition, acute cold stress, and etc. heighten susceptibility to disease.

Table 10 below summarizes all losses reported in the sampling, by cause.

Table 10. Ovine Losses and Their Causes

	No. Reported	Average Per Household	Range	Percent of Average Flock As of 1 Yr Ago
Diarrhea	105	3.8	0-16	11%
Pedation	67	2.5	0-9	7%
Other diseases and "Unknown"	19	.7	0-5	2%
Accident or Straying	7	.3	0-2	1%
TOTAL	198	7.3	0-19	21%

As Table 10 indicates, disease -- primarily in the form of the dread diarrhea, q'icha -- constituted the major contributor overall to losses during the year surveyed. As noted in McCorkle 1982a, another in the accelerating cycle of ovine diarrhea epidemics was just tailing off upon my arrival in Usi.[27] And according to village consensus, this was the worst in living memory. Even during the few hours of my original site survey, stockowners bemoaned the terrible plague at length. Once establilshed in the community, I listened to one after another "hard luck story" in this regard. For example, a number of unrelated informants described how one man lost all but 20 of his flock of 100 sheep to this scourge during the past year. (This individual is not included in the sample since he refused to be interviewed. Perhaps, quite understandably, he was rather embittered on the subject of sheep.) Another comunero not included in the same but who practices the puna estancia regime reportedly suffered similar q'icha losses. Hence not even the reputedly healthier animals of the estancias escaped this plague. Although these are the most dramatic examples, they constitute only two among many such histories. Nearly all the families formally interviewed had their own to add. Such anecdotes merely confirm what is plain to see in the quantitative data of Table 10. Diarrhea alone unequivocably[28] accounted for 53% of all losses reported.

In addition to diarrhea, two other of the diseases discussed in publication number 4 of this series turned up in the stratified sample. Muyuy unquy (coenurosis or 'turning sickness') accounted for six of the 19 entries under "other diseases and 'unknown'." However, the percentage of deaths from this ailment is apparently neither alarming

nor unusual. It is perhaps noteworthy that muyuy unquy primarily manifests itself in older animals. One instance of qallutaka 'liver fluke' was recorded. Finally, a total of 13 deaths due to causes unknown were reported. Ten of these fell into the 0-1-year age groups. The stockowners concerned generally expressed puzzlement over the cause of these losses, although a few tentatively cited the intense cold of the dry season.

After disease, predation was the second major contributor to the ovine death toll, accounting for 34% of all losses reported for the year surveyed. All the entries in this category in Table 10 were due to the fox, atuq. This is by far the most vigorous, and hence most hated, of the three local predators. Although both condor and puma were also reportedly active during the past year (see "Management of Predation"), neither appeared in the stratified sample. Indeed, with the exception of "mad" puma, the encroaches of these two species are normally fairly negligible compared to those of the gluttonous fox. On the average, households lost 7% (range 0% to 38%) of their flock to this scourge across the past ethnographic year. Judging from general village commentary, this figure represents a roughly typical annual predation rate for the fox. This is not to say, however, that stockowners' complaints are any the less vociferous on the subject of the hated atuq. Villagers especially complain of the fox's depredations among lambs. The misti prefers his meat young and tender, they say. This observation is unequivocably confirmed in the diachronic data. Of the 67 "fox meals" listed in Table 10, 55 or 82% fall into the 0-1 year ovine age groups. In accounting for neonate and yearling losses, the fox's predations alone outstrip all other factors (including diseases), whether taken singly or together.

Lastly now are losses due to accident or straying. As Table 10 indicates, such mishaps are relatively rare. A few households (six out of the 27 interviewed) may lose one or two sheep in this manner annually. "Accident" includes, e.g.: tumbling off cliffs; stumbling and breaking a leg or some other crucial part of the anatomy; drowning in the mud and muck of rainy season corrals or while fording a swollen stream; being kicked by other, larger species or being crushed by them within, or while exiting, the corral; and being struck by lightning. Also, sheep caught munching on crops may fall under this rubric; they may be beaten or stoned to death by the incensed field owners.

"Straying" forms a sometimes more nebulous category. Sheep occasionally wander off when young shepherd/esses become inattentive. Their absence may not be noted until the end-of-the-day count as the flock enters the corral gate. Of course, a search is instituted immediately. But when the vagrant or its carcass is nowhere to be found, Usinos immediately suspect opportunistic theft. Although no losses to theft appeared among the stratified sample for the year surveyed, during administration of the diachronic herd census interviewees described to me a number of rustling incidents for times past or for other villagers. These accounts are presented in McCorkle 1982b.

Turning briefly now to camelid losses, even in the epiphenomenal data of a sample stratified by ovine ownership, several lessons are to be learned. The first is that, taking raw totals of animals, the camelid population surveyed suffered a net decrease across the year of a mere 3%, declining from 144 to the present 140 head. Also, 70% of the camelid-owning families interviewed enjoyed net herd equilibrium (35%) or gain (35%) -- in sharp contrast to village oviniculture, where only 3% did as well. A surviving average birthrate of .8 largely offset households' average loss of 1.0 camelids. And again in striking contrast to ovine neonate and yearling losses, of the fourteen camelid births recorded, only one failed to survive.

As to losses per se, these were primarily due to disease. The principal offender here was qarachi 'camelid mange' which strikes adults and juveniles alike (cf. McCorkle 1982a). Fifty percent of the camelid-owning households reported bouts with this ailment during the year. However, through painstaking and repeated treatments (ibid.), half of these families were successful in curing all of their afflicted animals. Without such intensive veterinary attention -- which Usinos readily lavish on their precious camelids -- losses to qarachi would have been much greater. While mange accounted for 79% of disease deaths, and 65% of all losses, in absolute numbers these figures represent only eleven animals lost to qarachi out of the diachronic census' initial total of 144.

A number of interviewees reported that diarrhea also struck their herds. But again thanks to careful curing, no camelids died from this ailment. Aside from mange, only one other ill figured in the camelid disease toll -- punuy unquy 'sleeping sickness'. Three llama belonging to the same household succumbed to this mystery disease.

It is certainly noteworthy that, in the same sample which produced such dramatic ovine losses to the fox, not one camelid was lost to predation. This is due to several factors. First, of course, are camelids' -- and particularly llama's -- greater size, strength, and feistiness. In consequence, both foxes and condors generally steer clear of adult llama. The smaller, more timid, and dull-witted ovine offers easier prey. Still, these two predators may occasionally carry off lone juvenile camelids. However, villagers say that under normal circumstances, such attacks are usually thwarted by the male defense response of encircling the young and the females, ready to trample, kick, and block the attacker. Only the puma poses much real threat to llama, particularly when they are surprised in their corral at night and thrown into cramped confusion. But the puma's visits are rare. (See "Management of Predation.")

Another factor behind low camelid losses to predation is that Usinos do not stint on time, trouble, or expense to save a camelid life. An anecdote may illustrate this observation.

> During my stay in Usi an infant taqsa was attacked in the puna by a condor. The shepherd managed to separate this formidable bird from its prey but not before the condor had taken a

roast-sized bite from the terrified creature's flank. When the shepherd notified the owner of this disastrous event, the latter immediately hiked up to the puna, gathered the animal in his arms, and carried it all the way back down to the village. He doctored the wound with herbs and petroleum and then crudely stitched it closed. Thereafter, he devoted several days to nursing the taqsita, dropping all other chores. Today, the animal is alive and healthy. To celebrate its recovery, the anthropologist was required to regale the household with free photos of the beaming owner and his wife taking turns cradling the infant in their arms. They could not have been more proud had it been their own child.

Finally, two losses to "accident" were recorded in the stratified sample. Fatal camelid accidents are reportedly fairly rare and usually consist of falling off cliffs. The two incidents cited were just that. In one case, however, the owner added -- somewhat ironically and as if to exonerate the llama involved -- that his own burro had pushed the unlucky creature off the precipice. No thefts of camelids appeared in the stratified sample. However, under "other" losses, one llama died of old age -- an indication that, as suggested in the subsection on age composition of herds, Usinos are maintaining elderly camelids as well as sheep.

Summarizing now, camelids appear to have weathered the year fairly handily. Even with the sample's limited and derivative data, it is clear that these species manage very much better in the Andes than the alien ovine. This is hardly a surprising finding in view both of the camelids' many natural adaptive advantages and of the extra care villagers lavish on these beloved and valuable creatures. In contrast, sheep suffer greatly from local predators (notably the fox), expire from the dry season cold, and when droughts and epidemics strike, begin to "drop like flies," as it were. Indeed, the devastating combination of drought (with its attendant forage lacks and frosts) and a virulent diarrhea epidemic largely accounts for the year's exceptional average loss rate of 21% of household flocks, and the very low level of surviving births. I say "exceptional" because, if this situation were typical of every year, there would soon be few sheep left in Usi. The implications of such atypical, but recurrent, annual losses for issues of overstocking and overgrazing are explored in the section conclusion.

Culls. As noted earlier, culls are conceptually distinct from losses in their purposiveness. Complex decision-making factors are therefore involved. To give but a few examples, these may include: animals' age, sex, and physical or reproductive condition; overall herd size and composition; seasonal changes and availability of forage; market prices and pressures; household needs for money or meat; community obligations.

In the diachronic herd census, culls were grouped into three types according to the principal motivation stockowners gave for each cull recorded: to provide meat for daily home consumption, to furnish meat for ritual requirements, or to obtain cash for whatever purpose. I

should note that the distinction between ritual and non-ritual occasions for meat-eating is naturally a somewhat fuzzy one. Here, however, I limit the former to highly formal ceremonial events such as community-wide fiestas, certain religious holidays, t'inka, ritual hair cuts, and so forth. While other events calling for outlays of meat may also be notably "ritualized" (e.g. ayni and mink'a gatherings, or "special" occasions such as visits from misti officials or from relatives living far distant), they are comparatively more "unmarked." Hence I class them with daily home consumption. This distinction is not entirely arbitrary. It roughly parallels an emic one relating to whether fresh meat for roasting as kankachu is ideally required, or whether more mundane dishes of boiled ch'arki, such as qaspa, will suffice.

Before examining the three types of culls, several general observations are in order. First, mature rams and wethers are always preferentially culled when the need arises. As the pastoral "capital," ewes are maintained as long as they are healthy and while any hope remains that they may still be fertile. This qualitative observation on Usinos' part is borne out directly in the quantitative data on culls, as well as indirectly in the synchronic herd age compositions examined earlier. Of all culls listed in the diachronic census, 86% were rams or wethers.

Regarding age of culls and excluding for the moment such complicating factors as disease or certain ideal requirements for sacrificial victims, stockowners naturally take off their oldest animals first. Usinos say they dispatch all ovines by age six because "After that, their meat is no good and the comerciantes will not buy them." (Needless to say, though, villagers take great delight in passing off on the merchants as old or ill an animal as they can possibly get away with.) As a rule, ewes are never slaughtered before age six unless the creatures are barren, infirm, or clearly "on the way out" from disease. Rams and wethers may be culled earlier (between 3½ and 6 years) as necessity and flock age compositions dictate. Only under extreme circumstances and when no other suitable animals are available will yearlings be slaughtered. For example, one household in the stratified sample was forced to take off three yearlings in addition to four older sheep (a whopping total of 39% of its flock as of one year ago) in order to meet its massive ritual obligations this year.[29]

Sacrificial culls form something of an exception -- ideally if not always really -- to the foregoing rules. As noted in "T'inka," these should be perfectly healthy, uncastrated, pure white rams in the prime of life. However, the quantitative data on such culls reveal that nearly half (42%) of all those recorded fell in the 4+ age group. This is hardly the "prime of life" even by Usino standards. I am likewise very dubious that the healthiness and whiteness stipulations are often met, given the incidence of ovine disease and the preponderance of stippled and spotted sheep in the village. At any rate, rather than cull predilect studs, many families "cheat the gods" a bit with an older ram. Of course, to the degree that ritual prescriptions are

flouted, to that degree, too, the efficacy of the ceremony may be impaired.

Finally, as to the seasonality of culling, as noted earlier under "Slaughter," there is no one major saca in Usi. Villagers cull aperiodically and only as immediate needs demand. As remarked in "T'inka," however, there is some tendency for ritual kills to cluster in the lean months toward the end of the dry season -- for reasons doubtless related to seasonal scarcity of forage for animals and dwindling vegetable food supplies for humans.

Turning now to culls for daily home consumption, on the average households slaughtered 1.6 sheep (range 0-8) expressly for this purpose during the year surveyed. While a portion of such kills is usually consumed immediately as fresh meat, the bulk of the flesh is jerked and eaten bit by bit across the following months. One note of caution is in order here. This aggregate figure hardly tells the whole story of daily household meat consumption. In fact, it appears that more mutton entered family stewpots as a result of losses than of culling -- at least during the year surveyed. In contrast to the sample total of 198 sheep "lost," only 100 culls (for ritual, non-ritual, or whatever purpose) were recorded. Even in "normal" years experiencing neither droughts nor epidemics, I would calculate that easily half the typical family's home consumption is comprised of salvage meat and "desperation" culls.

The within-group culling data -- both quantitative and qualitative -- are of particular interest for consumption patterns. The quantitative figures display an unmistakable progression in average number of culls from pastorally poor to wealthy families: I .9, II 1.4, III 1.6, and IV 3.4 sheep. It is equally significant that the only familes in the sample who failed to cull any sheep for home consumption during the past year all fell into category I; they also comprised more than half this category. Two of these informants stated that they never cull solely for daily consumption because their flock is so small. One added that his family merely relies upon "whatever the foxes and diseases leave us" -- i.e. upon salvage meat and "desperation" culls. A third remarked that, while she normally takes off at least one sheep annually for the family stewpot, she did no culling this year because so many of her flock died of diarrhea. "We ate those, instead," she shrugs.

As a result of disease and other pressures, category I was also the only one in which real culls (.9) for home consumption fell wide of the group's stated average annual ideal (1.6). (The latter figure for categories II, III, and IV was 1.5, 1.6, and 3.7, respectively.) In direct contrast to the above comments of category I informants stand those of III and IV members. They say they allow themselves such luxuries as eating meat monthly, slaughtering for birthdays and for relatives' and others' visits, or butchering whenever a kinswoman gives birth -- "the better to nourish her."

Turning next to ritually motivated culls, not surprisingly these, too, pattern according to families' relative pastoral wealth. The aggregate average of such kills was essentially one sheep (.9) per household per year -- almost invariably for the principal ovine t'inka. (Other ceremonial slaughters attested in the sample included Easter, ritual haircuts, and cargo obligations.) But while all families in categories II and IV sacrificed a sheep for this year's uwiha t'inka, only 53% in categories I and II did so. The latter substituted guinea pigs or, in one case, chickens instead. Moreover, while category III and IV stockowners indicated that they always cull a sheep for the t'inka every year, a number of individuals in I and II stated that they never do so -- again, "because our flock is so small."[30]

Sheep slaughtered for sale constitute the third type of culls. These averaged 1.2 across the full sample, at a mean sale price of S/4,500. Again, however, the aggregate figure does not tell the full story. Ten families, all found in category I or II and comprising 37% of the stratified sample, made no commercial sales during the year. The remaining 17 households averaged sales of two (1.9) sheep. If we compare the current flock sizes of these two groups, one unassailable fact emerges: on the average, the flocks of those making sales are nearly three times larger (35.4 versus 12.7), even after a year's worth of losses and culls. Looking within groups, not surprisingly we also find a progression, similar to that of culls for home consumption, in average number of sales from pastorally poor to wealthy families: I .6, II .6, III 1.8, and IV 2.6.

The decision to sell in all the cases listed was universally motivated by households' perceived need for cash, coupled with the opportunity to sell (the arrival of an ambulant merchant[31]). Furthermore, 67% of those reporting sales during the past year explicitly stated that they never sell unless they have an immediate need for money.

The diachronic herd census also asked all informants who reported commercial sales the following, qualitative question: "What factors led you to sell when you did?" By far the most frequently cited reason (16 of the 17 respondents) was to meet cash needs for ayni in agriculture. When such workgroups are organized, the host household is expected to provide its guest-laborers a better-than-average meal. This entails not only substantial amounts of meat (either fresh or jerked) but also purchase of such luxury foodstuffs as rice, noodles, oil, and chiles, along with generous supplies of coca, liquor, and sometimes tobacco as well. Such items can normally only be obtained with cash. Here again we see a crucial, socioeconomic, interaction between peasants' agriculture and their pastoralism. Paraphrasing Murra (1965:192), lack of ownership of animals is a social disabiity as well as an economic one. Being herdless sharply limits household access to the hospitality and prestige goods required in a social and economic system predicated on institutionalized reciprocity. In short, in yet another way quite as concrete as manuring, plowing, clearing, etc., Usinos rely on pastoralism to help carry out their agriculture effectively.

Briefly, 56% of the households making culls for sale this year also cited the need for certain store-bought items for daily domestic and/or occasional ritual consumption. These included the goods listed above plus others such as sugar, salt, kerosene, matches. Fifty percent of the respondents also adduced family clothing needs as a common reason for selling a sheep. While Usinos generally weave their own skirts, ponchos, carrying cloths, sacks, ropes, blankets, belts, and infants' wear, they purchase sweaters, sandals, hats, trousers, shirts, and additional bayeta 'homespun' in the marketplace.

Six households further indicated that family crises have in past induced them to sell sheep. Specifically, illness and death were mentioned, along with the attendant costs of doctors, medicines, and funeral paraphernalia. One interviewee commented on his need for cash with which to carry out court battles and pay fines and judicial fees. As noted earlier, another household had exceptional cargo costs to meet this year.

Turning finally to camelid culls, for llama the rule is a simple one -- Usinos are loath to slaughter these beloved creatures. Although ideally one llama per year should be sacrificed at the species' t'inka, in reality this is almost never done. Once in a great while, families with substantial herds cull for the llama t'inka; but even then, they readily confess to selecting an extremely aged and/or infirm animal rather than the prescribed young, healthy beast. With regard to daily home consumption, by and large Usinos are not fond of llama meat. They say it tends to be tough; and some informants further claim "It can make you sick" if eaten fresh rather than jerked. (Nevertheless, in characteristic peasant "waste not want not" fashion, when a llama dies of disease, accident, old age, predation, etc., any salvageable flesh is jerked for the family stewpot.) Nor are llama culled for commercial meat sales. "The negociates will not buy it." In any case, villagers do not raise llama for food or monetary profit. The species' primary value lies in its function as a beast of burden and, secondarily, as a source of manure and fiber.

In contrast, alpaca meat is relished as a delicacy. The few Usino households who keep alpaca report that every two or three years they may slaughter one for the family larder. Indeed, the sole camelid cull recorded in the diachronic herd census consisted of one such alpaca.

Reviewing the culling data presented, one general observation is inescapable. Vis-a-vis pastorally poorer villagers, households with larger flocks (26+) clearly take advantage of their good fortune to enjoy a higher standard of living -- whether in daily diet, in social and ritual life, or in purchasing power. This point is of interest because it addresses a common development concern. I.e. if development efforts were to be successful in upping pastoral production -- here defined in sheer size of herds --would peasants concomitantly increase offtakes or would they merely hoard the "extra" animals in a conservative savings-account strategy? A corollary question is: if offtakes are increased, to what end? Would peasant producers heighten their daily home consumption, their social and ritual consumption, or

their commercial sales -- in the latter case, thereby funneling more meat into the larger national economy?

The answer to such questions is, once again, that peasants are quite as economically rational as, say, Western social scientists. Given the opportunity to enhance their lifestyle through increased offtakes, they will do so, likely maximizing across all fronts -- monetarily, dietarily, socially, ritually, and savings-wise[32] as well. This answer is suggested both in the culling data stratified by household flock size and in participant observation and informant commentary.

For example, we have already seen in the quantitative data that households with larger flocks make more sales. Their resulting, above-average, cash income is not expended solely upon the absolute necessities of life in a remote Andean village. This fact is readily and materially manifest in even a brief visit to such households in the form of: e.g. house size and construction; the plethora of kitchen, agricultural, and other accoutrements, such as lanterns and radios; rods bending under the weight of the clothing hung upon them, and ample trunks and boxes of stored cloth and weavings; wooden tables and metal beds; and so forth.

Dietary differences are readily observable, too -- e.g. in the more meaty dishes served to the pesky anthropologist who manages to barge in at dinnertime. Indeed, a cultural ideal shared by pastorally poor and wealthy alike is to have meat with every evening meal. While the latter can speak only wistfully of this ideal, the former boast that they achieve it.

Regarding social and ritual consumption of meat, we have already seen, too, that the pastorally wealthy readily cull for birthdays, guests, etc., and never fail to sacrifice a ram for the uwiha t'inka. In contrast, many poorer families say they cannot afford to meet even this minimal ritual obligation in their ovinicultureure. However, there is little doubt that, given increased pastoral production, these same families would sacrifice faithfully, since failure to do so ideologically jeopardizes their whole flock. They would likely also up their level of participation in the village cargo system and, with it, their access to the human social resources so crucial to Andean subsistence.

In short, based upon community-internal stratificational evidence, given larger flocks (above the 25-sheep minimum) many peasants would almost certainly increase their culling in order to better achieve own-culture ideals. They would thereby realize a significant improvement in both perceived and actual quality of life. For example, cognitive dissonance would be assuaged by proper fulfillment of supernatural tasks like t'inka, which are considered just as necessary to good animal management as natural ones. Moreover, through the heightened cargo participation which increased herds would allow, individual self-images, household access to human resources, and community social structures would all be strengthened. Further, more meat would be

added to the diet -- for after the gods have supped their less tangible viands, the sacrificial flesh of course falls to humans. Finally, from a community-external point of view, as more slaughters for sale (whether for purchase of ritual paraphernalia, replacement items, or consumer goods) are made, more meat is channeled into the national economy.

The foregoing view of potential development outcomes in communities such as Usi may be challenged by some as overly roseate, given the received wisdom that indigenous peoples are characteristically conservative in offtakes and view herd animals as items of great prestige to be hoarded indefinitely. These observations bring us to the issues of overstocking and overgrazing.

As we saw in "Pasturing Patterns," overgrazing appears to be a real problem in Usi's intermediate zone -- at least in the sense of "degradation of animals." When such overgrazing is added to the skewed age structure of campesino flocks and Indians' seemingly low rate of offtakes, there might appear to be considerable prima facie evidence that peasants are irrationally overstocking. But relative to a gamut of factors -- the harsh realities of oviniculture in the Andes, the high demands and risks of paleotechnic cultivation in the sierra, the multiple functions of animals in agricultural and other regards, basic household needs, and so forth -- they clearly are not.

The rationales behind at-first-glance irrational herd age compositions have already been reviewed. Those behind herd size and culling practices bear further examination. Both are best explained, not in terms of traditional conservatism or prestige, but rather in terms of sheer survival within a difficult environment. The quantitative data on losses are particularly pertinent here, although they merely confirm what Andean peasants already know -- that their herds are at all times vulnerable to conditions beyond the control of a paleotechnology. This is especially true for ovines in the Andes. For example, given woefully inadequate veterinary resources plus peasant flocks' generally poor nutrition, disease can literally decimate a family's holdings in a few days. Without proper shelter and protection, a freezing wind shortly after shearing time or a single rampaging puma can do the same in a matter of hours. Added to these more aperiodic catastrophes are the regular forays of the fox plus the recurrent droughts of the region -- when, as Orlove (1976:213) has noted and as we have seen here, herds may easily be reduced by as much as a quarter.

In short, there are high risks of loss in Andean peasant pastoralism. But losses -- and with them, herd size and culling rates -- cannot be judged solely on the basis of "average" years. Rather, it is the extreme year, the freak crisis, which must be considered. A single bad season can destroy the peasant pastoralist already "on the edge." The formula here is a simple one. As LeBaron et al. so succintly phrase it, "The best way to hedge such risk is with larger numbers [of animals] because it's better to lose 30 percent of 20 than 30 percent of ten" (1979:204). Put another way, the family who owns

twenty sheep and loses ten can still entertain hopes of rebuilding its flock; but the one which owns ten and loses ten... Worse still in dialectical terms, if pastoral devastation coincides with agricultural failure -- as well it might in the Andes -- from whence will come the cash for interim food supplies and the manure and money for seed purchases with which to renew planting?

LeBaron et al. offer some additional thoughts of interest on the issue of Andean agropastoralists' putative overstocking. With herds' all-important function of manure production in mind, these authors point out that large numbers of animals relative to range resources simply facilitate the searching out of all available forage -- forage which ruminants obligingly process and deposit as fertilizer upon the very fields from whence it came, or which (recall "Corrals") they collect from otherwise non-arable marginal lands and transport to the crop zone. While, indeed, such "overgrazing" may adversely affect animal nutrition and growth, LeBaron et al. (1979:204) further observe of Indian peasants' flocks that "little scrawny animals seem perfectly adapted" to this intensive foraging/gleaning task. Moreover, sheep are the species best able to survive where grazing resources are the most run down. Hence, at least from the perspective of the peasant household, the benefits of "overgrazing" (again, here employed in the sense of degradation of animals as versus of intermediate-zone rangelands) largely outweigh its drawbacks. Dialectically, it is noteworthy that these benefits apply principally to peasants' agriculture, while the drawbacks pertain primarily to pastoralism per se.[33]

Finally, these same authors also note that, relative to household needs and given a typical flock size of 15-35 with a reproduction of less than 50%, Andean agropastoralists may not be overstocking at all. "Under the circumstances, family direct consumption, donations to fiestas, and some sales may represent something like a maximum offtake rate" (ibid.). "In short," they conclude, "large flocks ['large,' that is, relative to grazing resources] are required to support even minimal household consumption" (ibid.).

While still further factors could be adduced in explanation of herd size, composition, and culling in Andean agropastoralism, the foregoing are, I think, sufficient to establish "peasant rationality" in these regards. There is an important caution here for any efforts at pastoral development which might propose to lessen pressure on rangelands through such seemingly obvious "improvements" as, e.g.: "more rational" culling of greater numbers of animals in general, or of older ones in particular; or substitution of fewer but "better" and larger breeds which would be just as (or even more) productive of meat and wool. Such suggestions are open to a number of questions and caveats. Most notable among these is the fact that meat and wool production are not the sole -- or even necessarily the primary -- aim of peasants' stockraising. Certainly, in dialectical terms the most important function of herds is manure production. This raises the immediate question: would fewer and/or "better and larger" animals render equivalent quantities of fertilizer? It seems unlikely.

Moreover, "better" breeds require better feed; otherwise, as we saw in "Breeding," they promptly sicken and die. And "larger" animals can introduce unit problems with regard to meat sales and storage.

In sum, to paraphrase Horowitz (1979:61), development programs must thoroughly comprehend the fundamental logic of herd structure and herd size given the kind of pastoral enterprise being dealt with -- here, one which is inextricably and dialectically intertwined with paleotechnic agriculture and geared to household subsistence. Failure to do so will inevitably result in participant resistance to proposed "improvements" which in fact threaten the very core of families' economic existence.

Management of Predation

It is appropriate that, having begun this report with a focus on ideological aspects of animal management, we conclude with something of the same. In Usi, management -- or again, "non-management" -- with respect to predation is supernaturally, as well as naturally, motivated. It is therefore necessary to examine not only the actuality but also the ideology of the community's three predator species: fox, condor, and puma.

The Fox (probable Dusicyon culpeas). As we saw in preceding sections, this is by far the most troublesome predator in Usi. However, the fox, atuq, that plagues village herds is not the small, reddish animal the Western mind images. Rather, judging from the pelts I examined, Usi's atuq is a large, grey-yellow dog-like creature -- genus Dusicyon, probable species culpeas.[34] On the whole, it resembles a coyote. D. culpeas reportedly ranges up to 4,000+ m in the Andes and it may measure over a meter in length. It is the largest of the South American foxes and the primary one known to prey on sheep (Walker 1964).

As the most active of the local predators, the fox is also the most hated. The atuq shares this honor with that other major economic oppressor of the Indian, the misti. Indeed, the two are expressly associated in village folklore and myth. This association is carried over into daily parlance, where the fox is frequently referred to as the teniente gobernador (a mestizo official). As one man explains, the name is appropriate "because he always receives his due; every year he comes for his payment." Equally often, the fox is dubbed simply "the misti" -- "because he always takes things away from us," observes another informant. This predator is seldom called by its proper name, atuq. Villagers believe this may attract the fox's attention to the person who has uttered its name and cause it to attack her/his herds.

According to informants, the fox attacks sheep of all ages but only juvenile llama. Its modus operandi is described as a leap to the throat where it fastens itself to the jugular and proceeds to "suck the blood" of its victim. Villagers add that like the loco weed husqa, the atuq also has "magnetic" powers. I.e. it can attract sheep of their own will to its open jaws. Once the atuq has secured and dispatched a victim, it reportedly slings its prey over one shoulder "like a man carrying a costal" and goes running off so rapidly that no human being can catch it -- only, maybe, a dog. Once safely away, the fox begins its meal, going first for the heart and tripes. Villagers say the teniente gobernador is so inordinately fond of these delicacies that it may slaughter two, three, or as many as seven sheep in a single day, eat only these portions, and leave the rest of the carcass untouched. In hopes of salvaging at least some of the meat, Usinos always search for animals lost to predation (also accident and straying; recall "Losses and Culls"). They are usually successful in recovering at least a portion of the flesh, albeit sometimes days later. But even semi-putrescent meat is processed into ch'arki[35] 'jerky' and consumed bit by bit across the following months.

The ravages of the fox among Usi's sheep are substantial. Seventy-four percent of the stratified sample of stockowning households reported "payments" to the teniente gobernador across the past ethnographic year. As noted in the preceding section, the fox alone accounted for 34% of all ovine losses during this period --second only to deaths due to the aggregate of all diseases. The average household loses 2.5 sheep annually to the atuq, although this figure may range as high as nine. To hear villagers' laments, a flock's remaining unscathed across a year is little short of miraculous. And households have been known to lose nearly half their sheep to the atuq within the space of a few months.

It is small wonder, then, that this predator is so hated in Usi. The occasional destruction of a fox is cause for community-wide celebration. The following story of one atuq's demise was recounted to me with great relish by a number of people.

> A certain gimpy fox was famed throughout the community for its numerous incursions despite its lameness. "This fox caused everyone to cry." I. e. almost everyone's flocks had suffered its attacks.
>
> One day, this gimpy fox was surprised in the act of killing a young ewe. A group of the village men doing faena (communal labor) witnessed the event and raced to the hunt, pelting the invader with stones. One man finally managed a well-aimed throw that stunned the creature and toppled it into the stream. The dogs were upon it immediately and, as the men caught up, they set to gleefully bludgeoning it to death. The body was collected, dried, and put on permanent display in the village schoolhouse.

Such strokes of luck are quite rare, though. Usinos have few really effective weapons with which to confront the fox or, for that matter, any predator. They possess neither guns nor machetes -- only agricultural implements, slingshots, stones, and dogs. Nor do they set any traps or institute systematic hunts to control predator populations. While they make no attempts at control, stockowners of course do take some protective measures. Shepherds and dogs keep a look-out during daytime grazing, ready to drive off hungry predators. At night, herds are corralled with the household hounds to stand guard. The dogs sound the alarm and rouse the household at the approach of danger.

Finally, there is an interesting sociodynamic outcome of the fox's predations, in addition to the obvious economic one. When the atuq makes an exceptionally successful raid on a family flock (two or more sheep), or when the toll across a period of months has mounted to distressing heights and then is topped once more, the precipitous out-migration of the young shepherd/ess on duty may be triggered. One such incident took place during my stay in Usi.

> While a shepherdess was pasturing her family's herds, the fox attacked and killed several sheep. Young girls are often quite frightened of the atuq. A common panic response is to abandon the animals, rush home to the safety of the village, and breathlessly report the affair to all and sundry -- including the resident anthropologist. A party is then immediately organized to return to the site and seek the predator and its prey. However, to this girl's natural terror of the fox was added the fear of her parents' anger. Across the past few months, the family had already lost a number of sheep to the fox. Now, she would surely be punished for negligence.
>
> Accordingly, the shepherdess abandoned the herd and fled to Quiquijana, there to await the afternoon train. Back in the village, as the hour for the girl to return with the animals came and went, her mother became worried and set out to hunt for them. She found the frightened herd, realized what must have happened, drove the animals home, and then flew down the mountain to seek her daughter. Luckily she reached Quiquijana before the train did and, amidst tears and reassurances, fetched the girl home.

According to informants, such occurrences are not uncommon, although they do not always have such happy endings. The adolescents who leave under these circumstances may not be seen or heard of again for years. Villagers observe that their parents pass many long nights wondering about their children's fate and heaping recriminations upon themselves. They are always overjoyed when the runaways reappear years later -- often by then as married and/or fully acculturated adults, however. Reportedly, incidents like the one described above constituted the major impetus to permanent or semi-permanent out-migration among Usino youths in past. (Today, however, newer and stronger impetuses to migration have come into play, e.g. acute population pressure and the attractions of wage labor.)

The Condor (Vultur gryphus). Like the fox, the condor assaults ovines of all ages but generally only juvenile camelids -- and these latter not always successfully. Relative to the fox, however, the condor attacks village herds only rarely. Usinos say this predator is most active from March/April to August. Even then, it appears only in the punas. In consequence, households that maintain estancias (whether temporary or permanent) or that board animals in the punas are normally the only ones to suffer from its ravages.

During my stay in Usi, I learned of only one visit from the condor. It attacked a half-grown taqsa (a llama-alpaca crossbreed) -- predictably enough, in April in the punas. The taqsa's owner described to me how the condor hunts. It chases along the ground after its prey, he says. When the victim is within reach, the condor leaps onto its back, sinks its talons into the flesh, and enfolds the creature in its enormous wings "like a blanket." It then proceeds to rip at the flesh with its powerful bill. In this instance, the condor managed to take a

roast-sized bite from the taqsa's flank before the unfortunate creature could be rescued.

Other than the foregoing, Usinos had little to say about the condor. It is difficult to tell whether their silence on the subject is due merely to the facts that its visits are rare, and that it is primarily a carrion eater. It is possible that other, unverbalized ideological constraints may be at work. Significantly Dr. Luis Barreda (pers. com.) reports that in his years of research throughout the southern sierra, he has been unable to elicit much comment from Indians about this huge bird of prey. Among Paratian pastoralists, however, Flores (1979:83) found a specific proscription upon killing condors. Whether such a proscription exists among Usinos, I cannot say. However, they do share the general Quechua belief that condors are the domestic fowl of the apu, awesome mountain spirits. As with the puma (see below), villagers may well feel that slaying a condor will anger its master and bring retribution upon the killer. In any event, they make no effort to control this predator. And, as one man pragmatically points out, condors build their nests high on rocky pinnacles where no man can go.

The Puma (Felis concolor). The local puma is a subspecies of the one found in North America. Although its incursions in Usi are normally infrequent, they are devastating. Not even powerful adult llama are proof against the puma's claws and fangs. However, according to Cabrera and Yepes (1940:170) this predator has a marked penchant for sheep and will often pass up all other prey in favor of the ovine. Along with villagers, these authors also note that Felis concolor kills excessively and senselessly: "...en efecto, es un gran destructor de animales, matando, como por pasatiempo, muchos mas de los que precisa para mantenerse" (ibid.). Typically, the puma eats only a small part of each kill, sometimes contenting itself with merely licking the blood a bit before seeking its next victim. Neither does this cat drag prey back to its den, but instead feeds on the spot (a behavior which facilitates meat salvaging). The puma customarily hunts at night and seldom strays far from the punas Of late, however, Usi has been plagued with a far more daring "mad" puma. Shortly before my arrival this creature reportedly made two particularly dramatic raids. In one, it broke into the corral of a puna estancia and slew fifteen of a flock of thirty sheep in a single night. In the second -- an afternoon sally close to the nucleated settlement itself -- this "mad" puma dispatched an adult llama and a sow.

Even with such provocation as this, however, Usinos take no steps to apprehend the marauder. In part, their inaction is due to a variety of ideological and cosmological beliefs surrounding this fierce and greatly feared predator. Puma lair in the most remote and rocky regions of the high punas. Logically, therefore, they, like the condor, are closely associated with the apu.[36] Indeed, Usinos say puma are the "children" of these ancient spirits. Although I elicited no explicit taboo on killing puma, it was clear that villagers were hardly keen on the idea. Such an act would be dangerous not only "naturally," given the Usino armoury, but also supernaturally. Surely an apu would be greatly angered by the murder of one of its "children."

Moreover, a puma's attack is often interpreted as a rightly deserved warning or punishment from the apu. A mountain spirit may become incensed if it is not paid proper respect and attention e.g. if an individual omits a certain ceremony in its honor or performs the ritual cheaply or ineptly. The angry apu will then send one of its "children" to wreak destruction upon the offender's herds. Apu also punish all sorts of "evil doing" in the same fashion. When the puma is sent thus in chastisement, the apu's intent is said to be manifest by the cat's eating only the hearts of its victims.

An interesting corollary of such beliefs merits brief mention. Under normal circumstances (i.e. "not-mad" puma) households consistently utilizing high-zone rangelands are naturally the ones to suffer most from this cat's depredations. Of course, these people own the largest herds in Usi. They are also therefore much more subject to envidia, institutionalized envy -- as I can attest from village gossip and informant commentary. The puma's attacks may work to defuse such feelings somewhat. In essence, this predator serves as something of a natural socioeconomic leveler in pastoralism.

Finally, many Usinos believe that puma are essentially impossible for a common man (or Indian, at least) to kill. In fact, villagers are not far wrong in this assessment given, once again, their extremely limited armoury. Even with the most modern equipment, careful planning and expert tracking, Felis concolor is quite difficult to apprehend among the rocky peaks of the high Andes. (See, for example, Hudson's anecdote of a puma hunt in Cabrera and Yepes ibid.).

However, villagers attribute the wily cat's survival not to natural but to supernatural causes -- again, in the form of its powerful "parents" and protectors, the apu. Usinos claim that the puma knows immediately when a hunt for it is planned, and it promptly goes into hiding. Also, it knows where and when people lie in ambush hoping to trap it. As one man ruefully observes, "One can sit up night after night, like a soul in purgatory, waiting for the puma to come. But it never will. It knows that you are waiting. It will come only when it knows that you are unprepared." The apu informs its children of humans' plans and helps hide the puma in its high, windswept peaks.

In short, Usinos themselves essay no offensives against the puma. This is not to say, however, that they allow ideology to obscure practicality. Quite the contrary, as evidenced in one incident concerning the "mad" puma. At one point, village elders approached me to inquire, at once hopefully and slyly, whether I might not be able to enlist some gringo or misti hunter possessing rifles to come to Usi, track down the creature, and destroy it for them.[37] Thus, they doubtless reasoned, they would be harmlessly rid of this scourge and yet would escape the wrath of the apu.

In sum, Usinos' general approach to the management of predation might be succinctly characterized as consummately pragmatic. Other than fortuitous killing of foxes, villagers do nothing by way of actively controlling preadator populations. They instead limit themselves to more passive, protective measures (supervision of herds by shepherd/esses and guard dogs). Yet this is a rational stance in

view of the larger context of the problem. It comes as little surprise that villagers organize no systematic hunts for predators. These efforts would be largely impractical given Usinos' poor weaponry, the difficulty of tracking in the rocky Andes, and, perhaps most importantly, the peasant agropastoralist's already overburdened schedule of labors. Similarly, it would make little sense for Usinos to utilize other predator-control measures such as traps or poisoned baits. These items would require significant cash outlays. Moreover, under the community regime of rangestock operation, traps and poisons might prove as destructive to domestic species (herd animals and dogs) as to predators. Such measures might thus introduce new sources of internecine conflict over animals.

Furthermore, villagers' "non-management" of predation may have certain beneficial, if unintended, consequences. The most obvious, of course, is the natural damping of overstocking and, with it, overgrazing -- a real problem in Usi's intermediate agrolife zone, as we have already seen. Less obvious but more intriguing are the negative effects that systematic eradication of predators might have upon household nutrition. Were it not for salvage meat, animal protein would form a far less regular and significant part of the family diet. Given the vigor of local predators, and of the fox in particular, such "accidental" inputs of meat substantially increase protein intakes across the year. Without predation, humans' meat consumption would be almost entirely limited to but a few ritual occasions annually.

Just as indigenous "non-management" of predation may produce certain unintended advantages, project-imposed management might have unintended, and unwanted, disadvantages. Some of these have been adumbrated above, e.g.: exacerbation of social tensions through removal of natural leveling mechanisms or through introduction of inappropriate technology in the form of traps and poisons; and insult to native ideologies, along with a heighthening of cognitive dissonance, through the wholesale "murder" of powerful spirits' "children" and domestic animals.

Still other, broader processes such as ecological balances are at stake in predator control, too. These can have direct, dialectical impacts. To take but one example, what effect would eradication of predators -- a measure designed to enhance pastoral productivity --have upon agricultural productivity, e.g. in the form of native rodent populations' depredations upon ripening fields and stored crops? In sum, as noted in foregoing sections, development projects must take great care in modifying even such seemingly simple aspects of indigenous animal management as predator control.

SUMMARY REMARKS AND IMPLICATIONS FOR DEVELOPMENT

Reviewing the mass of data presented here, it is evident that in many respects, Andean peasants' technoevironmental management of herds works to the detriment of overall pastoral productivity in any absolute sense. Often, stockowners themselves are among the first to admit that certain of their animal husbandry practices are wanting -- even vis-a-vis their current technological, environmental, and informational resources. (These observations are perhaps even more dramatically illustrated in Publication number 4's discussion of ethnoveterinary management.)

However, the key questions for development are, first, why these apparent shortcomings exist and, second, how -- or even if -- they can be modified. As the dialectical model predicts and as I have endeavored to show throughout this report, in any agropastoral adaptation -- Andean or other -- the answers to such questions of pastoral productivity and efficiency must always be relative to the subsistence system as a whole, i.e. to cultivation as well as herding. The complexity of the relationships--both positive and negative, integrative and disintegrative--between the two sectors of production makes for a corresponding complexity in development decisions.

The same may be said for producers' decision-making, too. Peasant agropastoralists must constantly juggle their households' scarce factors of production between cultivation and herding. They must delicately balance off the returns to each as best they can under ever-shifting conditions of climate, herd and domestic-unit composition, market prices, household and community needs, ethnic dominical drains, and so on ad infinitum. In essence, stockowners must therefore settle for an optimizing, as versus a maximizing, strategy in their pastoralism. This strategy is nonetheless consummately rational when viewed in its larger, dialectical context.

From a development perspective, there is clearly potential room for improvement in many areas of Andean peasant pastoralism. But, at least on the strength of the baseline research presented here, the precise form and direction development action might take can be spelled out in only a few instances. Docking provides an example of one such area. As we saw, Usinos are already familiar with, and value, this management technique. Moreover, there exists a ready-made technocultural context for promoting its more systematic use. Better still, the context itself (one which aggregates labor) likely obviates the need for costly equipment. Ceteris paribus, in a few other instances the immediate direction for development also seems clear. To wit, "do nothing." Recall, for example, the discussion of castration.

The foregoing cases are the exception rather than the rule, however. While I do not wish to disappoint the development reader, the fact remains that the complexity of interrelationships at the systemic (between agriculture and pastoralism), subsystemic (among various aspects of pastoral management) and even suprasystemic[38] (between target community and dominant ethnic/national structures) levels of subsistence poses an awesome challenge to development decision-making.

Indeed, we have just seen this illustrated even in such seemingly straightforward aspects of animal management as predator control.

A further, concrete, example will help to emphasize this "interrelatedness" point. Let us reconsider the topic, broached early on in this report, of shearing and wool production in Usi. Villagers themselves express considerable discontent with this aspect of their animal husbandry. It would therefore seem an excellent candidate for development attention. Recall that one of stockowners' major difficulties in this area is releasing sufficient and/or sufficiently skilled labor from a concomitantly hectic agricultural schedule in order to shear at the proper season. I.e. conflict arises at the systemic level.

Certainly, appropriate technology could help resolve this shearing -time conflict -- e.g. in the form of simple, manually-powered clippers which could speed the task and perhaps also better the average shearer's performance in terms of more complete removal of the fleece and fewer injuries to animals. But the age-old question arises: can peasants afford such cash-expensive technological inputs? Likewise for notions of training shearing specialists for hiring out within the community. As it is, few people can afford even the services of the village's existing semi-specialists.

The issue of ovine wool production further illustrates both systemic and subsystemic conflicts and constraints. Assuming that all shearing problems have been resolved, development action to increase fiber yields could conceivably take one of several forms. Genetic improvement of the criollo's fleece characteristics or introduction of some "woolier" race is one possibility -- in theory, at least. But as noted in "Breeding" and in this series' publication (McCorkle 1982b) on the social organization of herding, under a household-level regime of rangestock operation villagers lack the labor either for extensive fencing or for overseeing the within-species herd divisions necessary to control breeding. While castration offers an alternative method of genetic control (a fact which Usinos fully appreciate), there are good reasons for not castrating too many rams under the present high-risk ecological and managerial conditions of Andean peasants' oviniculture. Moreover, castration would prove a viable method of genetic control only if the community as a whole could be persuaded to practice it congruently. Otherwise, given grazing grounds crowded with the animals of many owners, plus various pastoral associations which aggregate herds and share out herding duties across households (id.), the benefits of selective castration would still be lost to indiscriminate breeding.

Finally, leaving aside the question of improved breeds' often more delicate health, even if the desired characteristics were to be achieved and maintained, development efforts would next run up against the maxim: better breeds require better feeds. Indeed, it is my opinion that animal nutrition constitutes the "bottom line" for a host of pastoral development aims. There is obviously little point to making more, bigger, healthier, "woolier," or "better" stock in

whatever sense if the creatures cannot be adequately fed. Yet modification of this most basic aspect of the herding subsystem -- pasturing patterns and foddering -- poses the thorniest problems of all. Some of these problems -- ecological, technological, and sociological -- were adumbrated in the conclusion to the section on feeding. Chief among them was, again, dialectical limits on pastoral labor. These limits are such that most Usinos cannot fully exploit even what feed resources are already available to them (the punas).

Futhermore, at the systemic level, providing better feeds almost inevitably implies radical impacts upon agriculture -- whether the recommended action might be to cultivate fodders as well as food crops, to seed fallow fields with non-indigenous grasses and clovers, to introduce silaging, to remove herds permanently to the punas (thereby depriving fields of their manuring/clearing/reseeding/trampling services), or whatever. If achieved, moves such as these could enhance herd nutrition and production; but they would do so at the expense of cultivation unless accompanied by substantial reinforcement of the agricultural subsystem as well. Insofar as such proposals threaten the subsistence strategy as a whole, they will be self-defeating and will understandably encounter serious -- and perfectly "rational" -- peasant resistance.

The above example should, I think, amply illustrate the "interrelatedness" point. At the same time, it highlights one of the single most pervasive challenges to pastoral development in communities such as Usi -- dialectical shortages in labor, or perhaps more precisely, shortages in the social organization of labor. This critical issue forms the subject of the sixth report in this series (McCorkle 1982b). Along with technoenvironmental considerations, it constitutes one of the key factors in any successful formula for development.

In sum, any approach to development -- whether of herding or of cultivation -- within a paleotechnic agropastoral context must perforce be holistic and dialectical. Often, it may be necessary to address agricultural improvements before pastoral ones; and vice-versa. Any proposed change -- even the seemingly most minimal -- in either sector of production must be thoroughly analyzed in terms of its potential repercussions throughout the subsistence system as a whole. While this truism is given frequent lipservice in development, it nevertheless bears repeating. Where families are balanced on the edge of survival, miscalculations can be fatal.

This gloomy reminder is not to say there is no place for development in such milieux, however. Quite the contrary; to judge from this research, Andean peasants themselves are naturally eager to up their pastoral production -- but not at the expense of other, critical, subsistence activities. In this regard, one very simple, but very important, recommendation for SR-CRSP activities can be tendered: consult peasant stockowners themselves as to the benefits and problems they foresee for any proposed action before it is implemented.

Any more specific SR-CRSP/Peru recommendations are difficult to make at this point. The baseline research reported here would profit from further data -- especially, e.g., in such sensitive areas as pasturing regimes. And, such data should be drawn from a variety of disciplinary viewpoints. Along with the findings presented here, such information will yield richer insights and more concrete directions for development when subjected to a combined analysis by specialists in the panoply of pertinent fields -- not only rural sociology/anthropology but of course also animal genetics and nutrition, veterinary science, range management, economics, and agriculture. Indeed, only such a collaborative endeavor can hope to cope with the dialectical intricacies of a preindustrial agropastoral adaptation in one of the world's most complex environments.

[1]With the obvious exception here of ethnoveterinary management. Because of the highly technical nature of this topic, and hence the more specialized tools of analysis it requires, it is given separate treatment in publication No. 4 of this series (McCorkle 1982a).

[2]For example, the community boasts a full functioning cargo system with universal, voluntary participation. The village is endogamous and still retains vestiges of the ancient Inca moiety system. And, except for the interface provided by sales of meat and subsequent purchases of a few commercial items, Usinos stand largely outside the larger money economy.

[3]A detailed chart of the village agricultural cycle is available upon request by writing directly to the author.

[4]Except for communal designation, under the muyuy system, of fallow lands open for grazing. But this is as much an agricultural, as a pastoral, decision.

[5]However, households of closely-related kinsmen who regularly cooperate in herding may hold some 'inka jointly.

[6]This constitutes another example of how camelids are "special" and enjoy more "personhood" than any other domestic species in the Quechua world. No other animals join in the ritual drinking in Usi.

[7]However, C.A. Fiedler, an Andeanist specializing in ideology, informs me that all Usi's t'inka occur at times of the year significant in the Incaic calendar as well.

[8]Although the four or five families possessing alpaca may well hold t'inka for this species too, I did not investigate the question. Horses and burros, however, are clearly excluded from the village t'inka system. Even if their numbers and importance in Usi were much greater, it is doubtful they would ever be included (in contrast to Valderrama and Escalante's 1976 report for horses among "pure" pastoralists of Apurimac). Informants always went into gales of laugther whenever I inquired if a given ritual or belief concerning ruminants applied to any other species. Indeed, it was not long before I, too, began to find the idea ridiculous. Although my linguistic researches did not touch upon Usinos' macrotaxonomies of the animal kingdom, it is clear that villages categorize herd animals differently from other groups. For example, Flores (1978) found that pure pastoralists of Paratia make a primary distinction between wool-bearing (alpaca, llama, sheep) and non wool-bearing (cattle, horses, mules, burros) herd animals.

[9]Acting under the instructions of a village elder, I purchased all the necessary fetish items at the regional market. The man and his family then enacted for me the complicated preparation of despachos, complete with ritual drinking and incantations. As would a visiting friend or relative, I also joined in the ceremony. This was in no sense "mock," as evidenced by the man's storing away the completed

bundles for use at his next t'inka. However, since ideology per se is not a focus of this report, I refer the reader to Mayorga et. al. for a full description and analysis of despachos corresponding closely to my own.

[10]In a classic self-fulfilling prophecy, a villager detailed to me how a sheep had stumbled and broken a leg in one of these locales. The man therefore concluded he must have omitted naming the area in his despacho preparation some months ago.

[11]My suspicion is that Usinos have learned or heard of docking from other groups where it is more commonly practiced -- e.g. in neighboring pastoral haciendas or communities -- but failed to grasp its full rationale. Lacking any parallel in camelid management, villagers may have elaborated their own folk theories. It would be interesting to discover whether similar emic explanations are shared by other Andean agropastoralists.

[12]Households with few sheep naturally engage in joint herding and t'inkikuy (see publication No. 5 in this series, McCorkle 1982b) more often than do those with large flocks. But animals herded together interbreed freely. Hence, the strict genetic control theoretically achievable through systematic castration within a household flock would be thwarted anyway. This still does not fully explain why households with small flocks fail to castrate, however. The ideal of household self-sufficiency in herding enters in here. Labor-poor families nevertheless entertain hopes of achieving this ideal -- and with it, fuller control of flock genetics -- at some point in the domestic life cycle. In anticipation of independent herd operations, they therefore put off uwiha kapay. This interpretation is further supported by analysis of flock compositions in temporarily extended households, where the animals of a parental couple and those of their co-resident, married children are herded together. Such aggregated flocks show lower-than-average proportions of wethers. In effect, the young marrieds forego castrating their burigus until they establish a separate herd upon achieving neolocality.

[13]The ceremony is a simple one. A man rubs the live sheep over the bodies of its owners, both husband and wife, while intoning words to the effect that with the act "May the bad luck pass away; may your luck be changed." The same man then slaugthers and butchers the unlucky animal in the normal manner. However, this must be done well out of sight of the owners lest the luck-changing process be impaired. The flesh is cooked immediately and must be totally consumed. The owners are required to eat particularly heartily.

[14]Usinos try to make do with the community's one naturally-occuring salt lick. But because of the time expenditure and dangers involved, animals are only infrequently trailed to the qullpa. Accordingly, they run increased risk of parasitism and plant poisoning (see publication No. 4 in this series).

[15]Indeed if one wishes to raise alpaca, access to an estancia is mandatory. "Lower down," say villagers, "the pakucha die". Authorities agree, noting that alpaca are more prone to skin disease and intestinal parasites at lower elevations. However, very few Usinos keep alpaca because of the scarcity of appropriate pastorage (bofedales) for this species in the coummunity's territory.

[16]This is a relatively theoretical point, however. Given the rule of communal grazing in the intermediate zone, other households' animals perform these services for estancia owners' fields. And in the low zone, the stubble-grazing rights to chacras not utilized for this purpose by their owners are rented out to other stockowners.

[17]The principal fear here is garachi 'camelid mange' (see McCorkle 1982a). Note that this separation of camelids represents one of Usinos' few attempts at prevention of contagious disease among their animals --if not across, at least within household herds. As usual, it is no surprise that such "extra" efforts are taken only on behalf of the beloved camelids.

[18]I can personally vouch for both these claims. I have often watched llama nibbling along the edges of ripe habas fields but never once did they seem tempted by this delectable. As for the llama's "homing instinct," one evening while I sat interviewing a woman, half her herd of llama arrived unattended at the corral door. The other half, along with the husband who had been sent to fetch them, did not appear. As her concern grew with the deepening of night, the woman kept leaping up to peer down the mountainside until finally, with a distracted apology, she rushed out of the house to seek the absentees. So much for the interview... It turned out that her husband was wandering through the darkness with half the herd, vainly searching for the others that had beaten him home already.

[19]When rental arrangements are long-standing or when renters are short on storage facilities, the fodder is delivered to the oxen owner early in the dry season, directly after it is threshed, as payment against next year's plowing. Per-day rental fees are figured in "man load" units called tercios. One tercio gains the hire of one bull for one day. According to informants, this fee has never fluctuated from time immemorial. Finally, families lacking both oxen and sufficient challa for exchange are in a difficult position. If payment in some other form (usually labor or manure) is unacceptable, the renter may be obliged to labor for another individual in return for challa with which to pay the oxen owner. In such cases, two days' labor reportedly earns one chacras' worth of challa.

[20]I hesitate a bit to use the term "overgrazing" here for two reasons. First, it is unclear just what would constitute "overgrazing" when pastures and fields are one and the same. For example, to speak of achieving sustained forage yields on such lands is meaningless since they will be periodically plowed under. Second, "overgrazing" is employed in varying senses in the literature. At its most extreme, the term implies permanent damage to the environment,

resulting in the inability of rangelands to regenerate naturally. But students of pastoralism worldwide have remarked many problems in determining whether this condition exists in a given locale. For example, seemingly devastated ranges may often be merely epiphenomenal of a drought period. They may be quite capable of restoring themselves when the rains return. Range ecologists and agrostologists argue that to distinguish true degradation from short-term declines in production and temporary changes in species composition due primarily to several years of below-average rainfall requires the accumulation of evidence over a long period (more than a decade at minimum). (Cf. Horowitz 1979.) While the foregoing notion of overgrazing is certainly applicable to the punas of the southern Andes and the well-known drought cycles of the region, again it seems largely irrelevant to intermediate-zone pasturage. Alternatively, however, "overgrazing" may merely refer to the inability of the range to provide sufficient food for existing herds. For Usi's intermediate zone this is, I think, a more useful working definition.

[21]For exceptionally clear discussions of this syndrome which also incorporate sensitive analyses of its grounding in land tenure patterns, overstocking rationales, social organization, and other factors, see LeBaron et al. 1979 or Bjonnes 1980 for the Andes and the Himalayas, respectively. Also consult the February 1982 issue of Mountain Research and Development, entitled "State of Knowledge Report on Andean Ecosystems." For a dissenting view of this syndrome in the Andes, see Orlove 1976. Guillet 1981b:151 offers a balanced comment on both sides of the debate.

[22]This phenomenon has been remarked elsewhere in Peru -- not only for the punas of the sourthern highlands (pers. com. from a government agronomist in Cuzco Department) but also for the central Andean paramos (Stewart et al. 1976). Aside from "rustler" explanations emphasized by Usinos and Stewart et al.'s informants alike, abandonment of high zone rangelands may have its source in broader factors, depending upon the particular region and its history.

For one, during the last decade, agrarian reform gave many peasants greater access to richer agricultural lands "lower down," thereby turning their productive focus away from higher, more difficult zones. But communities already possessing such lands have also increasingly exploited them to the relative neglect of higher zones. As Guillet explains, "As a rule, the lower the ecological zone, the more capable it is of sustaining intensification, without costly, labor intensive inputs... ...as rural communities experience population pressure and market penetration, they tend to change their production focus from higher to lower ecological zones" (1981a:147). Also Spanish hegemony encouraged such shifts early on, through relocation (the reducciones) of indigenous populations to the low zone. This was done not only to facilitate tighter political control but also to promote production of European foodstuffs, which naturally flourish best at lower altitudes.

[23]Interestingly, some of the opinions diverge from those of the Nunoans studied by Winterhalder et al., and from these researchers' calorimetric studies of the different dungs' efficiency as fertilizers and fuels. While Nunoans prefer cattle droppings for fuel, Winterhalder et al. found that camelid excreta contain more potential energy than either bovine's or ovine's. And although Nunoans agree with Usinos that sheep manure is a less desirable fuel, they cite a different reason: that it produces an acrid smoke.

[24]A woman described to me how, early one rainy-season morning, she discovered a ewe lying dead on its side in a corner of the corral, all but buried in the mud and muck. The woman drew the carcass aside into a sunny spot on the patio, "So it could dry out some before we butchered it." The story has a surprise ending, though. While the family was breakfasting, the ewe -- seemingly restored to life by the inti's warming rays -- lept up to join them! "I guess she just dried out enough," the owner muses.

[25]A methodology appendix discussing sampling and other fieldwork details is available by writing directly to the author. The appendix details in full the census protocols and their construction, plus the sampling procedures and rationales. Results are presented here in summary tabular form for ease of discussion. Many of these data are drawn upon in this and other publications in the series, e.g. in discussion and analysis of t'inka, castration, breeding, pasturing patterns, predation, theft, disease. Therefore, their significance in these regards is generally only briefly re-capped here.

[26]Peru has undergone wracking inflation during the last decade. From 1972 to 1973, the rate of inflation increased from an earlier, fairly stable, 7-10% to 15% a year. Thereafter, it continued to rise at an alarming rate, reaching 75% in 1978 (after Appleby 1982:3). The official exchange rate went from 38.7 soles to the dollar in 1970, to 250 in 1979, to over 900 in 1983.

[27]Fortunately for me. There is always the risk that calamities coinciding with the anthropologist's entry into a community will be blamed on the newcomer. However, I didn't at first appreciate just how lucky I was to have arrived towards the end, rather than the beginning, of the epidemic. Later researches revealed a popular folk etiology which holds that diarrhea epidemics and other animal ills may be caused by malevolent foreigners!

[28]I say "unequivocably" because additional losses to diarrhea are assuredly hidden in the diachronic herd census' category "slaughtered for daily home consumption as ch'arki". Q'icha deaths are therefore likely underreported in the sample.

[29]This family was one of two serving as piruwisti (from the Spanish Prioste) for Cruz Velakuy this year. This is one of the highest offices to be had in the village cargo system. This voluntary position entails heavy monetary and meat outlays, e.g. for purchasing liquor and religious paraphernalia, hiring a band, feeding a complete meal to the whole of one moiety, paying for masses, and so forth. In return, of course, the household receives great prestige and respect -- intangibles which can be translated into tangible resources later on, e.g. in the form of political support and labor reciprocities. Without flocks, however, families cannot aspire to the ritual, social, and economic well-being that major participation in the cargo system brings.

[30]It is interesting to speculate on what emically constitutes "cart" and "horse" in this formula. I.e. are households in categories III and IV believed to enjoy pastoral abundance because they faithfully sacrifice a sheep annually and -- given a larger flock to select from -- perhaps more "properly" in terms of the sacrificial victim's characteristics (whiteness, healthiness, etc.)? Or is it just the opposite?

[31]Usinos normally sell to ambulant meat merchants known to them. They thereby avoid the extraordinary ethnic-economic dominical mechanisms levelled at them in the marketplace and assure themselves a fairer price--or any price at all, for that matter, given misti confiscatory practices.

[32]There is a possible hint of this in the quantitative data. While there is a natural progression in average absolute numbers of culls from pastorally poorer to wealthier households (I 2.6, II 2.6, III 4.4, IV 6.8), conversely, average annual offtakes rates relative to flock size may diminish. The Usino evidence is inconclusive, however, since these rates by category were: I 15%, II 11%, *III 14%, and IV 8%.

[33]Again, from the immediate household point of view. But at a larger, long-term level, agriculture may also be adversely impacted by the grazing erosion syndrome -- the major thrust of the LeBaron et al. article.

[34]Flores (1968:24) labels the fox he found in Paratia Dusicyon inca. Cabrea and Yepes (1940:127) also classify the "zorro peruano o 'atok'" as Pseudolopex inca. But the pelts I viewed in Usi correspond exactly both to Cabrera and Yepes' description of Pseudolopex culpeas and to Walker's (1964) photograph and report of Dusicyon culpeas.

[35]In Usi, ch'arki is made by rubbing the meat with salt and then alternately exposing it to the frosty night air and the desiccating daytime sun for a week or so. The amount and number of salt applications and the freeze-drying period vary according to the state of putrefaction in which the meat was found, according to whether it came from an animal with certain types of disease, and so forth. Meat that is totally lost to human consumption is nevertheless salvaged -- for feeding to the household hounds.

[36]In addition to the largest and most awesome apu of the region, the famed Ausangate, Usinos recognize four local ones. Three of these -- Q'impur, Aquya, and Marka -- are said to keep puma. Q'impur is considered by far the most fierce of the three. It is said to shelter not only puma but also, deep within its bowels, an ancient temple where devils and condemned souls dwell. Informants add that Q'impur once swallowed up an evil priest who traffiked with the devil, carrying him off in a flaming carriage, nina karu. The fourth apu, Susuya, is a rather benevolent spirit and so does not involve itself with such dangerous creatures.

[37]Given their request, I in fact did institute inquiries to this effect in Cuzco city. However, I was told that Peruvian law forbids the hunting of puma. One can, upon occasion, obtain a special waiver; but this entails a lengthy process of papeleos and tramites that would have been essentially impossible for a foreigner residing outside the city to pursue.

[38]As a community-based construct, the dialectical model does not incorporate this level. And, while its effects are hinted at here and there throughout this report -- and indeed, I could discourse upon them at length -- it lies largely beyond the scope of this work.

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