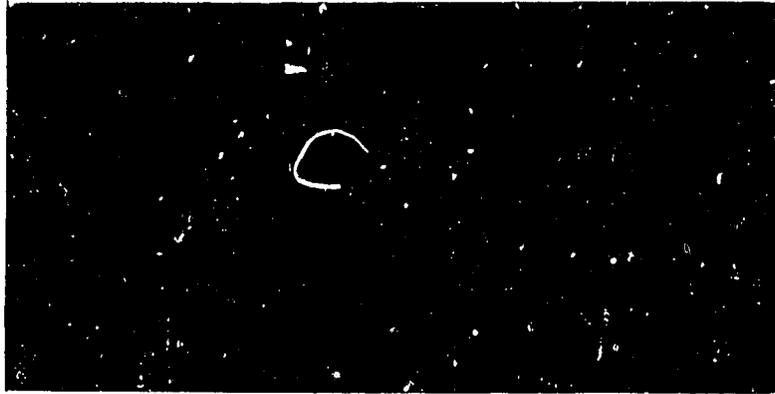


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Management of Animal Health and Disease
In An Indigenous Andean Community

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RESUMEN

Este informe es parte de una serie de publicaciones sobre el agropastoreo en una comunidad andina de indigenas. El presente trabajo describe el manejo etnoveterinario. Documenta la clasificacion y el reconocimiento "folk," la etnoetiologia (sea sobrenatural o natural), la curacion, y las tecnicas de control o prevencion de enfermedades pastorales mas comentadas en la comunidad. Los datos son comparados sistematicamente con aquellos proporcionados por la medicina veterinaria moderna. Asi se analizan tanto el alcance de los conocimientos veterinarios del indio, como la eficacia de las practicas resultantes.

Este analisis reabre el viejo debate sobre la racionalidad del campesino. Como es de esperar, el indio desconoce mucha de la informacion veterinaria de tipo tecnica. Pero, de manera aparentemente "irracional," tampoco utiliza todos los conocimientos que si posee -- especialmente para evitar o controlar epidemias entre sus rebanos.

La razon de tal anomalia radica en la naturaleza dialectica del agropastoreo paleotecnica y en las funciones multiples que el ganado desempeña en este sistema de subsistencia. La familia campesina tiene recursos insuficientes para la explotacion maxima de la ganaderia a causa de las demandas del cultivo en condiciones de escasez de tierra, falta de mano de obra, capital e informacion tecnologica. Pero dentro de estas limitaciones, el indio "racionalmente" aporciona sus pocos recursos para optimizar la produccion pastoral.

Finalmente, la dialectica inherente al agropastoreo preindustrial influye en la determinacion de cuales intervenciones serian factibles para fomentar el desarrollo rural del pastoreo. Sin embargo, queda claro que hay bastante campo para mejorar la salud -- y con esto, la productividad --de la ganaderia en comunidades tales como la aqui descrita.

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 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.

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Introduction

Perhaps more than any other single aspect of animal management, Usinos' response to their herds' health and disease problems most dramatically illustrates the tensions inherent in peasant agro-pastoralism. Here, problems in allocating scarce capital, land, labor and technology (especially technological information) for pastoralism are so intense that villagers often fail to take even the simplest "rational" veterinary measures. This "irrationality" is particularly evident in the area of prevention. Yet, as all Western authorities emphasize, prevention is the most important part of good veterinary management. Curing, for example, often proves uneconomical and impractical in even the most capital- and technology-intensive stock operations. But as we shall see, constraints in Usinos' contemporary agro-pastoral adaptation likewise make many systematic efforts at prevention just as impractical.

The following review of herd animal ailments in Usi is by no means exhaustive. I noted additional minor, or less common, ills either through direct observation or in conversation with informants (e.g. foot rot, moquillo or parasitic sinusitis). Unquestionably, still others common throughout Peru also abound in Usi. However, I investigated only the diseases most prevalent or most often cited by villagers themselves. The information thus collected therefore comprises a highly representative sampling of

folk¹ beliefs and practices, and furnishes an excellent data base for dialectical analysis of ethnoveterinary management.

Furthermore, allowing villagers to name and discuss the diseases they themselves consider most troublesome or worthy of comment constitutes a logical starting point for any applied action in veterinary management. Development efforts which first attack problems the target community itself identifies will be more successful than those which cleave to any preordained schedule of extension based on other-culture assumptions of "what is best for" recipients.

The discussion which follows is based on systematic interviews with from two to ten informants per disease named, according to the frequency with which peasants remarked each ailment. All informants were adult stockowners with years of firsthand experience in animal management. The respondent population was roughly 60% female and 40% male. The protocol employed (see Appendix) was a simple one consisting of a dozen open-ended questions on basic aspects of livestock ills. These ills clearly formed a matter of much concern in Usi, for informants all spoke eagerly and at length, and often voluntarily went out of their way to demonstrate anatomical, botanical, and zoological concomitants of their herds' diseases.

¹Within living memory, no veterinarian, agronomist, or other sort of extension agent has ever visited Usi. Reportedly, not even SINAMOS reached this "lost-valley" type site. Hence the ethnoveterinary beliefs and practices described here are likely among the most "indigenous" to be found in the Andes today.

Throughout this chapter, native descriptions of diseases and their diagnosis, cause, cure, and prevention are compared with the equivalent data available from modern veterinary medicine. This "translation" into scientific terms of Usinos' ways of conceptualizing, talking about, and combating animal ills is necessary in order to evaluate both the apt and inapt aspects of ethnoveterinary management.² Without such evaluation, development efforts cannot proceed effectively or intelligently, either in identifying the areas most needful of improvement or, subsequently, in communicating these needs and their corresponding development strategies to the target community.

The obvious first step in this comparative process is scientific identification of the animal diseases named and recognized in the culture under study. Here, though, comparison is sometimes problematic. Indigenous terms do not always correlate with Western ones. Veterinary science classifies diseases "after the fact," as it were, by etiology. Pending practical necropsy at

²Such comparisons should not be taken to imply any ethnocentrism. At issue here is not, per se the form that ethnoveterinary beliefs and practices take, nor even necessarily their extent. The aim is not to assess peasants' knowledge and skills by how closely these parallel veterinary medicine's but rather, utilizing scientific data from this discipline, by whether they promote productive animal management.

This orientation can be dramatically and instructively illustrated with examples drawn from the study of human disorders. Comparative analysis of theories and techniques in Freudian and Mayan (soul loss) psychology has shown that very different diagnostic and etiological concepts can lead to equally successful, albeit again very different, therapeutic measures. Indeed, in this example, the Maya seem to enjoy the higher cure rate! To take another example, more recently the efficacy of acupuncture for numerous clinical procedures has gained Western recognition.

butchering, however, folk systems (Western as well as non-Western) tend to name and diagnose livestock diseases by their most visible clinical signs. The result is that a single symptomological folk category, e.g. 'diarrhea' (q'icha), often spans a variety of ailments which veterinarians regard as distinct. Conversely, peasants may sometimes assign the scientifically "same" disease different labels --e.g. 'loco-weed eating,' 'turning sickness,' 'evil winds' (husq'a mihuy, muyuy unquy, and wayra, respectively) - - depending upon ethnodagnostic factors such as knowledge of the victim's recent whereabouts or of a neighbor's ill will.

In short, the "match" between scientific and indigenous terms is far from perfect. The two semantic systems understandably correlate most closely and most often when etiological factors are easily discoverable upon necropsy (e.g. tapeworms, liver flukes, and cerebral cysts in the case of kuru, qallutaka, and muyuy unquy, respectively), or when an ailment has patent manifestations (manges in qarachi, pink eye in nawsa q'uuyru) or produces fairly unique symptoms typically terminating in rapid death or ready recovery, thereby affording little time for "switching" diagnoses. There is least overlap in identifying lingering diseases, especially ones with non-specific syndromes (e.g. the diarrheas of q'icha or the sopor of punuy unquy) and/or ones which leave behind little evidence of causative agents.

Besides being imperfect in the foregoing respects, the "fit" between native and scientific terms is also a shifting one. As in medical matters anywhere, peasants make, test, reject, and draw

fresh diagnostic hypotheses across the course of an ailment. It may therefore pass from a more vague symptomological designation to a final, accurate, postmortem identification (e.g. q'icha - gallutaka or husq'a mihuy - muyuy unquy). Again, because Western veterinary classifications are etiological, the "fit" is closest upon necropsy.

Given the above considerations, precise identification of animal diseases from one system in terms of the other is not always possible. Nevertheless, in view of this report's concern for the practical needs of development, I have grouped the data into four major sections: "supernatural definitions of disease,"³ plus three "scientific" categories roughly corresponding to parasitic diseases, non-parasitic diseases, and plant poisoning. Both to avoid redundancy and to present the data in their proper cultural and cognitive context, however, each section is internally organized according to native disease designations. With the exception of supernatural ills, discussion of each disease compares indigenous with Western veterinary concepts along the following parameters: clinical signs and diagnosis, etiology, treatment, and prevention and control.

³Obviously, formation of a separate category of "supernatural" ills is, in this etic organization, particularly anti-emic since villagers themselves make little or no distinction between these and other, "natural" ailments.

Supernatural Definitions of Disease

Animal diseases are but one among many types of misfortunes that may befall the peasant household. As such, they are subject to examination and explanation in terms of the same sorts of "ultimate causes" adduced for other calamities. For example, 1) livestock ailments may represent a punishment sent by God for any sort of wrongdoing. Relatedly 2) sacred mountains (apu) angered by a stockowner's failure to pay them proper respect may visit an epidemic upon his herds in retribution. Or 3), the animals may have been hexed into illness -- often in revenge for their invasion of a neighbor's fields. 4) A mal viento 'evil wind' may enter and sicken livestock. Finally, 5) sometimes diseases are merely the means animals choose for following their master(s) into death. The creatures do so in order to remain with the individual who most loved and cared for them in life and to avoid falling into the hands of cruel new owners.⁴

As we shall see throughout this report, peasants may adduce such supernatural causes of livestock disease singly or in combination with other, more naturalistic ones. In either case, such beliefs are important in any consideration of ethnoveterinary management because they often dictate specific diagnostic, curing, or preventive action. To illustrate with the foregoing examples,

⁴One man reports that when his aunt died, 45, 27, and 8 of her sizeable herd of some 50, 30, and 10 sheep, llama, and alpaca, respectively, expired of q'icha for this reason.

in the case of 1) and 2), propitiatory measures are generally indicated. For 3), the appropriate curative measures may involve the "anti-hexing" aid of a shaman. In contrast, for 5) there is little to be done since the animals have essentially "made up their minds" to die. Number 4) above, "evil winds," offers a particularly dramatic example of the implications of supernatural definitions of disease for animal management and hence merits special attention.

Wayra - 'Winds'

Wayra may be given as explanations for many disorders, but they also constitute diseases in their own right. To class these ills as supernatural is not to say, however, that their clinical signs are necessarily any less than real nor even that certain cures (e.g. surgical removal of tumors) may not be effective. Indeed, Usinos generally do not differentiate these ailments from more "natural" ones which, as noted above, they also frequently attribute to "ultimate" supernatural causes.

Wayra comprise various types of winds which can enter and sicken both humans and herd animals -- particularly sheep. Interestingly, llama are generally believed immune. When pressed as to the reason for this curious immunity, informants set forth a number of theories. 1) Essentially, sheep are "the dumbest creatures on God's green earth." Hence, to paraphrase the old adage, "Sheep rush in where llama and humans fear to tread," i.e. into supernaturally dangerous places. Llama are much wiser and avoid these areas. Relatedly, 2) as smaller animals, sheep find

easier entry into such places, e.g. the tumbled-down interiors of precolumbian structures. Finally, 3) sheep spring and jump about a lot and llama do not. The significance of this observation is that with all four feet in the air, sheep lose contact with the Pachamama ('earth mother') who, on two separate occasions annually, has been painstakingly "paid" to guard them from harm. But, if a sheep is so foolish as to depart the realm of the earth (pacha) and launch itself fully into that of the air (wayra), the Pachamama becomes powerless to protect it. A wayra is most likely to invade the animal on such occasions.

It is tempting to elaborate an anthropologically more elegant explanation of the llama's immunity to wayra -- i.e. that camelids, as both the servants of the "ancient ones" (precolumbians) and as the original inhabitants of the Pachamama, enjoy an added "ideological adaptivity," just as the camelid's physical adaptation to the Andean environment is clearly superior to ovines'. This interpretation is strengthened by the fact that llama receive only one t'inka per year and sheep two. Apparently, the maladapted ovine requires at least double the ritual protection! While this argument may embody a certain "deep structure" logic for the llama's immunity to wayra, unfortunately it has not risen to "surface structure. Informants are unable to verbalize such analyses, perhaps because many are unaware that sheep are nonindigenous.

In the following sections I merely report informants' remarks on each wind in turn, and briefly describe its symptomology,

diagnosis, and cure for both humans and ovines. Besides the camelid immunity noted, several other general observations apply to all wayra. 1) These winds are seldom fatal. 2) In most cases, their symptoms in sheep closely resemble those of husq'a mihuy (ovine plant poisoning). This may often therefore be the "true" etiology of wayra, as well as the "scientific" reason for camelid immunity. 3) Curing carried out within the household is usually the wife's job. 4) Prevention logically consists of keeping animals away from the common haunts of wayra.

Machu Wayra. Also know as suq'a wayra, these are winds of the 'ancient ones' (machu) which blow from the burial sites and bones of precolumbians or from the casas de los gentiles, the great ruined pre-Incaic city lying within the bounds of Usi. Unlike the other winds discussed here -- which are simply indifferent animatistic manifestations -- machu wayra are actively evil, animistic personifications of individual 'ancient ones.' They attack both humans and ovines but never camelids. Informants were adamant on this latter point.

In humans, such winds can induce paralysis of the neck, hands, or other parts of the body, blackening of the face, emaciation, and finally death. Ovine symptoms are stiff neck, loss of weight and appetite, and "blind staggers." One further, occasional sign of machu wayra in both species is formation of a supernaturally induced tumor (suq'a) on some portion of the anatomy. When the growth is excised, tiny bones are discovered inside -- clearly the remains of the malevolent ancient one (suq'a machu).

Aside from this surgical process, typical human cures include purchased medicines or ground garlic, the latter to be ingested and/or massaged into the affected part. Sheep remedies are much more colorful. The animal may be rubbed with garlic, rue, ojotas (the popular automobile-tire type sandals), or a wiqlla (a gigantic wooden ladle). Such treatments follow the general cross-cultural pattern of "squeezing out" the invading spirit/object/whatever. The curative item(s) is passed from head to tail, from thigh to foot, and thus the invader is carried out c. the sheep's body.

Despacho Wayra. Despachos are the complicated fetish bundles prepared for burning in ritual payments to the earth. A despacho wayra is any wind which blows from one of the sacred spots in the puna where such payments are made. These winds are indirectly associated with the Pachamama but she does not cause or direct them. They can enter any person or sheep imprudent enough to loiter about such areas.

In humans, despacho wayra merely cause headaches. These are readily cured by filling a hat with cigarette smoke and then donning it, or by dashing alcohol on the face.⁵ The effects upon sheep are somewhat more severe: drunken stumbling and staggering for some two or three days and, in extreme cases, drooling and foaming at the mouth, emaciation, and listlessness. Normally, however, a simple smoke cure restores the victim to health. One merely burns a small pile of coca leaves in a corner of the corral and forces the sheep to inhale the fumes. One informant also suggests applying various herbs collected from the highest

mountains.⁵ Even if no action is taken, despacho wayra will usually depart the bodies of either species within a few days. However, in the most recalcitrant cases, recourse to a pampa misayuq (a shaman who divines coca) may be necessary. Although Usi has no such specialists, reportedly there are two in Pataq"iwar, a nearby pure pastoralist community. But their services are quite dear and, Usinos complain, often ineffectual.

T'uqaq Wayra. Literally 'exploding winds,' these are also known as muyuy wayra, 'turning winds.' They are tiny tornados or whirlwinds which form on the peak of one of the local mountains, Puqayaqa. They usually manifest themselves in the dry months of July, August, and September. Most likely a seasonal meteorological phenomenon of the particular microenvironment, these wayra are minimally harmful. They affect only sheep, again causing dizziness, staggering, etc. Since the ailment passes of itself in a day or two, no curative measures are taken.

Q"aha Wayra. Possibly translatable as 'hillside winds,' these emanate from any high places -- bluffs, mountain peaks, and the puna in general. They are little more than the natural phenomena of the realm of the air. In humans, this wind may cause head- and

⁵Anthropologist C. A. Fiedler (personal communication) points out the "like affects like" principle at work here. Since these ills are wind-induced they ideally should be cured with materials related to the domain of the air -- e.g. smoke, alcohol (which is often thrown to the winds in ritual supplication), or herbs collected from the highest mountaintops. Similarly, these remedies are most effectively applied to the head -- the highest part of the body and therefore the one most in contact with the realm of the air.

bodyaches, much as Westerners believe cold drafts promote "flu"; cures are largely as for despacho wayra. Ovines evidence no overt symptoms and hence no curative measures are taken. The fact that a sheep has encountered a q"aha wayra is discovered only at slaughter, when the hide parts from the flesh with exceptional difficulty.⁶

Parasitic Diseases

As a renowned sheep authority observes, "If it were not for the numerous parasites that plague sheep, the health problem of these animals would be a simple one" (Ensminger 1970:465). He adds that "Parasitism is most troublesome...where environmental conditions are most favorable for the development of those stages which the parasites must spend outside the host and where...sheep are confined rather continuously to a small area" (1970:466). Furthermore, rampant or epidemic parasitism is greatly promoted by (and, in turn, is an index of) overgrazing and poor pasture management. Unfortunately, all these conditions are met in Usi due to the six-month-long rainy season, the nightly corralling of herds in cramped, dirty quarters, and the lack of systematic pasture rotation.

Internal and external parasites together can account for higher herd losses and lower productivity in surviving animals than any other single factor (with the obvious exception of nutrition).

⁶There is one further wind known simply as viento comun or wayra. It affects only humans, causing dizziness, headaches, and bad vision. It is cured by rubbing alcohol or kisa (a local herb) over the face and head.

However, the most serious losses are due to internal parasites. Predictably, in the Andes, camelids host fewer types of parasites, especially endoparasites, than sheep. Camelids' relative freedom from such pests is, in part, due to their instinctive use of communal defecation grounds. Even so, the majority of camelid losses in Usi also result from (ecto)parasitism. Indeed, the ailments Usinos complain longest and loudest about among all their herd animals are parasitic in origin, even though villagers do not always recognize this etiology.

Q'icha - 'Diarrhea'

By far and away, the most frequently mentioned ill in Usi is q'icha. It affects sheep, llama, and also cattle. Reportedly, epidemics of it come and go across the years in the community, but with ever greater frequency of late -- an almost certain sign of overgrazing. The last epidemic is said to have struck eight years ago. At the time of my arrival, a second one of approximately three years' duration was just ending. It was so severe that several households' flocks of sheep were reduced by up to 90%, and almost no villager's herds escaped unscathed.

Clinical Signs and Diagnosis. Usinos naturally name and diagnose q'icha by its most obvious symptom. However, they remark a number of additional signs, many of which are merely the general indications of parasitism: weakness, fatigue, listlessness, and in one informant's words, overall "stupefaction" (azonzado), often with loss of appetite and consequent emaciation. Other indications are more specific to q'icha: onset of a fever which may pass shortly, blood in the urine and excrement, exceptionally watery and malodorous feces, foaming at the mouth, and in sheep, yellowing and dropping of the wool. Finally, one woman describes how affected animals may lose the ability to move, "as though their nerves were shrunken," and desire solely to sleep.

This jumble of symptoms which Usinos gloss as q'icha corresponds in fact to a gamut of diseases which, while they all share diarrhea as one of their major or minor indications, are recognized as quite distinct by veterinarians (see below).

However, Usinos are generally unaware of these differences, at least before necropsy. They also fail to note other signs specific to one or more of these conditions which would allow stockowners to distinguish one variety of q'icha from another, e.g.: yellowish or thin, greyish feces; bloating or swelling of various body parts, notably the jaw and abdomen; grinding of the teeth; an elevated and twisted head; and anemia, evidenced by paleness of eye, nose, and mouth membranes.

All informants claimed q'icha is highly contagious, yet most maintained that stricken llama could not infect sheep, nor vice versa, despite the fact that these species are often herded and bedded together. In this assessment, villagers are largely correct, for most of the causative agents are species specific. Finally, one man sagely observed that q'icha strikes juveniles with greater frequency and intensity than adults, as is indeed true for many of these diarrheas (see below).

Etiology. From Usinos' recitation of symptoms, a variety of ailments -- some parasitic, some bacterial -- can be identified in terms of their scientific etiologies. For Andean sheep, 1) through 3) below are among the primary offenders. 1) and 2) propagate themselves in a simple excremental cycle, and 3) in a more complex parasitic cycle involving snail vectors and, potentially, humans as well. However, villagers are largely unaware of such processes.

- 1) Coccidiosis, known in common English parlance as "red dysentary," is caused by a variety of parasitic protozoa (coccidia) specific to sheep.

- 2) Verminous gastroenteritis results from any number of stomach and gut worms, whose larvae sheep ingest while grazing infested pastures.
- 3) Hepatic distomatosis is engendered by liver flukes and may produce a constant diarrhea. Its premortem ethnodagnosis is therefore q'icha. Upon examining the liver, however, Usinos discover its "true" etiology and revise the diagnosis to gallutaka (see appropriate section).
- 4) Infectious dysentery, or "scours," is highly fatal to neonate and growing sheep throughout the world. It may have bacterial and/or viral etiologies.
- 5) Relatedly, another bacterium, Clostridium welchi, has been reported to cause a diarrhea which decimates llama offspring.
- 6) Finally, diarrhea may sometimes accompany enterotoxemia or "overeating disease." This is produced by Clostridia perfringes, which proliferates and becomes toxic when ovines are placed on high-carbohydrate diets.*

Folk ideas as to the causes of q'icha are much more colorful than the foregoing, scientific ones, however. Community opinion here is divided among a number of theses, although they are by no means mutually exclusive. Some of the more sophisticated comuneros in fact do relate the ailment to internal parasites, but usually only upon observation of massive worm infestation at slaughter. One theory holds that livestock ingest these worms during early-

morning grazing when pastures are still moist with dew. The tiny worms or worm eggs are said to be encased in the dew droplets. Other informants sustain a similar theory but claim the dew-ridden grass alone infects the animals. A few villagers also link q'icha to the mud-and muck-filled corrals of the wet season. Others say it results when livestock eat too much pasto fresco, the fresh new spring growth that replaces the desiccated and "burned" pastures left by the dry season frosts. All agree q'icha is most troublesome in the wet months.

Another, equally widespread but more startling, folk explanation of q'icha is that malevolent foreigners have polluted Usi's waters and grazing lands with some diarrhea-inducing substance broadcast from airplanes. Needless to say, this was one of the more uncomfortable bits of information the gringa anthropologist was required to digest. Finally, either singly or in combination with other etiologies, many villagers adduce various of the "ultimate causes" noted in the discussion of supernatural definitions of disease.

Treatment. As noted earlier, Western authorities strongly advise prevention over curing in all livestock ailments, parasitic or otherwise. Nevertheless, treatments of varying efficacy exist to combat many of these diarrheas. Most involve repeated drenching (the force feeding of liquid medicines) or feeding of fodders medicated with sulfanomides, antibiotics, antidiarrheals, and

*(However, clinical signs of CNS disorder and sudden death predominate in this disease.)

anethelmintics, followed by turning the stock out to fresh, uninfested pastures.

Such drugs are readily available in nearby Cuzco city or Sicuani. Yet of all the informants interviewed, only a handful report recourse to commercial remedies (see summary remarks). One woman purchased a drug named frascal for her flock's q'icha, but it proved totally ineffective. Ultimately, she lost 15 sheep to the q'icha in one year -- nearly half her flock. Because the medicine did not work, she concludes that the disease was brought on by witchcraft against her.

When faced with the possible decimation of their herds by q'icha, the overwhelming majority of Usinos respond with a variety of home remedies. The most popular treatment consists of assorted herbal infusions,⁷ the primary ingredient of which is usually the local plant uq"ururu, often along with another known as q"aya q"aya. The "prescription" for one such preparation runs as follows:

First, grind the uq"ururu, along with various other medicinal herbs (frescos), into a paste. To this add (an unspecified amount of) human urine and, for an adult sheep, one cup of cooking oil. Bottle-feed the resulting mixture to the ailing animal every two to three days.

Some Usinos substitute lemon juice for the urine in the above recipe but others claim this only worsens the diarrhea; also, it is more costly. Additional frescos (e.g. hanch'alli, kuti kuti)

and salt may be included. An adjunct strategy is to rub the sheep's body --feet, stomach, and especially the liver area -- with a similar preparation of warm urine and q"aya q"aya. One woman prefers a different cure:

Grind together the root of the achangayra plant with the stalks of ulluku (papa lisa). Boil the resulting juices in water. While the liquid is still warm, force-feed it to the animal.

For llama, one man recommends four to five bottles of such mixtures per day until the animal is cured. Another advises massive feedings of salt. Finally, a few people --those who believe the illness is supernaturally induced -- may seek out an altu misayug to effect a cure.

Villagers express great satisfaction with these folk remedies and particularly with their cost-effectiveness. They note that the only cash outlay required is the price of the cooking oil and salt. Many Usinos claim to have totally cured all or the majority of their g'icha-ed stock with herbal infusions. However, some add the caveat that if one has a very large herd (i.e. 50+), these cures are difficult to apply thoroughly and conscientiously to all the diseased animals, and hence some may be lost. Finally, one cynic notes that "Sometimes they just get well all by themselves."

Still, on the basis of repeated and fervent firsthand testimony, I am obliged to assume that these infusions must

⁷As a passing note here, these same preparations are used in treating human diarrhea as well -- a further example of the equation of herd animals and humans.

facilitate, if not entirely assure, an at least temporary recovery -- even though such testimony is difficult to reconcile with the actual figures on q'icha losses that villagers reported. A laboratory analysis of the active ingredients in the herbal pharmacopoeia would be revealing.⁸ If nothing else, however, the regular force-feeding of liquids may work to combat the severe dehydration of acute diarrhea. In contrast, the recommended salt cures are at best useless. In a personal communication, Dr. Blaine McGowan, Professor of Veterinary Medicine at the University of California -Davis and a specialist in ruminant diseases, opines that massive feedings of salt not only would fail to cure the animal of intestinal and other parasites, but would likely even hasten its death.

Prevention and Control. For the general prevention of parasitism, animal scientists advise a host of measures. However, most Usinos are ignorant of, or at least do not follow, this advice. In this and subsequent sections on prevention it is therefore more expeditious merely to enumerate the steps villagers do take rather than the multitude of those they don't. Review of the preventive measures they ignore and discussion of the larger significance of villagers' general inattention to prevention is reserved to the summary remarks.

⁸For the interested reader, photographs and accompanying textual descriptions of all these medicinal herbs, plus the major pasture plants of Usi's intermediate agrolife zone, are available in McCorkle 1980 through the University of Missouri - Columbia, Department of Rural Sociology.

Given "wet pasture" ethnoetiologies of q'icha and various other parasitic ills, Usinos correctly avoid grazing stock in the early morning. They seldom drive their herds to pasture much before 8:00 a.m., two hours after the tropical sun has risen. Only one informant (the women mentioned earlier) reports any efforts at cleaning and disinfecting corrals, other than the once-annual removal of manure to the fields. She purchased kerosene and creosol to spread about her canchones. Although both are effective vermicides, in lieu of any systematic program of prevention, this expensive treatment predictably failed to halt the q'icha. Other Usinos practice some corral rotation during the rainy season.

With regard to disposition of diseased carcasses, methods vary somewhat. However, the general rule of thumb for most endoparasitic ailments is to jerk the flesh, but with extra salt and an extra-long drying period to forestall any possible harm to human consumers. Upon deciding that an animal stands no chance of recovery, people butcher it before too much poundage is lost. This is a delicate decision, however, for "hope springs eternal" that the victim may recover. Sometimes it is therefore allowed to waste away entirely. In this case the emaciated carcass may be cooked, dried, and then fed bit by bit to the household hounds. Alternatively, it may simply be buried. The same procedures are followed when the meat is considered "bad," i.e. when flecks of spume are detected in the flesh. In any case, the innards are cooked and thrown to the dogs.

Kuru - 'Worm' and Uhu - 'Cough'

This section in particular exemplifies Usinos' imperfect technological information concerning their ovines' afflictions. Kuru refers to the common tapeworm. Most authorities consider this parasite nearly harmless. It only proves fatal in rare instances when its numbers are so great as to block the passage of food through the intestine. Otherwise, however, tapeworms produce no marked or specific symptoms --certainly not the hacking cough of verminous bronchitis, which arises from infestation by the thread lungworm, Dictyocaulus filaria. (Neither parasite produces any significant diarrhea.) But, Usinos wrongly ascribe uhu to kuru. The confusion is compounded by the fact that coughing may also indicate pneumonia or pulmonary adenomatosis -- both viral infections common among Andean sheep. In sum, like the symptomatic label q'icha, uhu therefore glosses several different scientific etiologies of respiratory disease.

While not evidenced in epidemic proportions in Usi, uhu seems nevertheless to be a constant ill. One informant estimates that, on the average, in a flock of some fifteen sheep, two to three per year will fall victim to uhu. As for kuru, another man astutely notes that "Almost all the sheep here have this worm." Perhaps villagers' equation of the two diseases is understandable in that all sheep which cough are, upon butchering, invariably discovered also to have kuru.

Clinical Signs and Diagnosis. All informants cite the deep sharp cough which racks the whole body of the sheep as the surest

sign of kuru infestation. Some note that kuru may also be present without this indication, observing that bits of tapeworm may be excreted in the feces. Others add that the dung of a kuru-ed animal is especially malodorous. All provide vivid descriptions of the kuru as "looking like a train" and "having the shape of a spaghetti noodle." Some informants state that sheep with kuru/uhu may be given to licking the earth in search of salt.

Usinos claim kuru/uhu is not contagious and is seldom fatal, except when there is a very high count of kuru. These are found in the intestines and liver upon butchering. Curiously, no informant mentions discovering the thread lungworms of uhu, although these are visible to the human eye upon close inspection. Finally, informants observe that the cough of kuru/uhu is impossible to shake once it takes hold. Even if the sheep seems to grow better for a while, the uhu invariably returns.

With the exception of the "salt-seeking," many of the foregoing observations are by and large correct for their respective scientific etiologies. But not only do Usinos confound the two ailments; they also miss a number of the more specific symptoms, particularly of uhu: dirty, pussy mucous discharges; rapid and difficult breathing; and discoloring and roughening of the wool, which may begin to fall out by tufts. If appropriate curative measures are not instituted, death by suffocation or pneumonia follows in a few months.

Etiology. The scientific etiologies of these conditions are as noted above. Folk explanations once again center, not

inappropriately, on pasto fresco and wet pastures infested with "worm eggs" or microbios (although one informant curiously links kuru to sheep's ingesting equine feces). Larvae of the thread lungworm require moisture in order to exist and migrate. In kuru, mites migrate up grass blades in the cool damp of dawn and retreat with the sun. Again, however, folk explanations ignore this intermediate host. But, villagers do aptly observe that kuru/uhu is most troublesome during the rainy season.

Treatment. Effective commercial vermicides are available for both kuru and uhu. But Usinos naturally prefer a much cheaper home remedy on which they are in 100% agreement: feed the animal salt. This can be accomplished in several ways. 1) Drive the animal to the one naturally occurring salt lick (qullpa) within the community's boundaries. 2) Feed it a handful of salt. 3) Drench it with several bottles of salt water. Villagers generally, albeit incorrectly, believe this remedy is quite effective if conscientiously applied. However, many sadly say they must forego such treatments because they cannot afford to purchase the necessary quantities of salt, or because trips to the qullpa are too time consuming, difficult and even dangerous (see below).

Prevention and Control. Aside from avoiding wet pastures, the major preventive suggestion Usinos make for kuru/uhu is predictable from the foregoing: regular salt feedings. Of course, the cheapest method is to drive one's herds to the qullpa frequently. Although a seemingly simple prescription, this is more easily said than done -- at least for stockowners residing west of the river,

for the qullpa lies on the eastern side. They must therefore make a lengthy hike downstream to a less than ideal ford where accidents are likely. A few individuals also recommend rotating animals to dryer corrals to decrease kuru infestation. Carcasses are disposed of largely as for q'icha, although here the flesh is believed edible fresh as well as jerked. As fresh meat, it can also be marketed to comerciantes.

Qallutaka - 'Slug'

Qallutaka (hepatic or fascioliasis distomiasis) has a great variety of names in both Spanish and Quechua throughout Peru. The common English term is "liver fluke." The 'slug' of qallutaka is a trematode of worldwide distribution which infects cattle, deer, and other species as well as sheep. Although camelids may also host this parasite, no informant mentioned this fact during repeated discussions of qallutaka or other ills. Apparently, therefore, it is not considered an important problem among Usi's camelids. In ovines, however, qallutaka is accepted as a constant, but not too serious, ailment. One informant estimates that perhaps only some ten percent of the village sheep suffer from it. In fact, however, the flukes are probably nearly universal but, as noted in the section on q'icha, the disease is diagnosed only at slaughter. Before that, it is merely dubbed 'diarrhea.'

Clinical Signs and Diagnosis. Usinos have little to say on the clinical signs of qallutaka other than describing the general effects of parasitism. In post hoc reasoning, some people mention its concomitant diarrhea. However, as remarked earlier, they miss a number of the more specific indications which would permit accurate premortem diagnoses of qallutaka. Instead, they identify the disease only upon discovery of the inch-long, slug-like p'alta kuru 'flatworms' in the liver. Villagers' descriptions of this parasite are vivid. "It is like a flat, brown leaf. Its back is brownish or black and its underside white." "It expands and

contracts itself much like seaweed."⁹

Etiology. Qallutaka is indeed caused by this 'flatworm' that "eats the liver." Some informants confess ignorance as to the origin of this parasite. Others tender the same etiologies of dew-ridden pastures as for q'icha and kuru/uhu adding that, like these two ailments, qallutaka is most vigorous during the rainy season. While, again, this etiology is partially correct, it ignores the parasite's life cycle and mode of dispersion, particularly its intermediate snail¹⁰ host.

Treatment. As another "worm"-induced ill, qallutaka is cured in the same manner as kuru/uhu. Western treatments call for a complicated schedule of dosing with anthelmintics, plus feedings of calcium.

Prevention and Control. Also as for kuru/uhu. Again, since Usinos are unaware of the intermediate snail host, they cannot even take the simple expedient of avoiding areas exceptionally infested with this pest.

⁹These descriptions are uncomfortably accurate, as I can attest. On one occasion, the day after I was regaled with a fine meal of roast mutton, my hosts -- aware of my interest in cvine diseases -- graciously invited me to photograph the collection of p'alta kuru they had carefully picked out of the liver of our preceding day's sheep dinner and saved for my inspection!

¹⁰Cusihuaman's dictionary lists a third translation of qallutaka as 'snail.' However, I do not believe this hints at any knowledge on the part of Usinos of the intermediate host, for informants related this word solely to the slug-like p'alta kuru itself.

Muyuy Unquy - 'Turning Sickness'

Known in Spanish as torneo or locura de ovejas among other terms, the technical term for this disease is coenurosis. It is a constant but not epidemic problem among Usi's ovines. However, it is much commented due to its sensational symptoms.

Clinical Signs and Diagnosis. Usinos aptly identify this disease in both its pre- and postmortem manifestations. They diagnose muyuy unquy by the dramatic behavior it engenders, and was almost poetic in describing it. One woman excitedly pantomimed how the sheep turns and twirls about, throwing its head far back, gazing up towards the heavens and crying out, "as though it were dancing." All informants concur with this description and have little further to add, except that the animal loses all interest in eating and dies very shortly. Western authorities, however, recognize additional, variable signs: falling down and thrashing about of the legs, softening of the cranium, blindness in one eye, grinding of teeth, aversion to flocking behavior, paralysis of the hindquarters, and coma.

Usinos and authorities alike note that muyuy unquy is always fatal. The former add that, due to loss of motor control, sheep are nearly as likely to die of accidents (falling over cliffs, striking heads on rocks, breaking bones) as of the direct effects of the disease. When they butcher, villagers correctly identify the large cerebral cysts, or bolsas de agua, of coenurosis and observe that these typically cover half or more of the brain matter. However, they wrongly claim that the disease

preferentially attacks the biggest, fattest, and healthiest young animals (instead, a characteristic of enterotoxemia). Finally, informants say the ailment is readily contagious.

Etiology. The great majority of Usinos attribute this malady to calor 'heat.'¹¹ Sheep become "hot" by ingesting fodder which is much warmed by the heat of the day, or by standing too long in the broiling sun or the warm, steamy excrement of the corral. In the latter case, informants explain that the steam rises to the brain and collects there, thus forming the bolsas de agua. All say muyuy unquy is most prevalent in the dry season, when the Andean sun burns most fiercely. Other, less common ethnoetiologies include: 1) contaminated drinking water, and 2) bodily invasion by a muyuy wayra, the mini-whirlwinds which appear in the alturas during the dry season. On the principle of "like produces like," these are what cause the sheep to whirl and twist about so dramatically.

Here, ethnoetiologies fall wide of the mark. Coenurosis in fact results from egg and larval infestation by the gid tapeworm, Multiceps multiceps, whose definitive hosts are canines. Sheep ingest the eggs upon grazing pastures contaminated by dog feces. The eggs hatch into larvae which encyst themselves in the brain or sometimes the spinal cord, thereby producing the motor and visual incapacities described above. When sheep brains are fed to the

¹¹See Foster 1953 for a discussion of Spanish and Latin American theories of disease and curing in relation to classifications of 'hot' and 'cold.'

dogs, the cycle renews itself. However, Usinos are unaware of this process.

Treatment. Veterinary scientists state there is no known economically feasible cure for muyuy unquy. Villagers essentially agree. Although they cite an interesting array of folk remedies, they ruefully remark that none is usually effective. Indeed, a successful cure would indicate a misdiagnosis (most likely, plant poisoning). I will simply list these curative procedures in rapid "recipe" form here.

1) Set fire to the hair of one skunk and force the sheep to inhale the smoke. 2) Carry the sheep into the river and score its ears with a knife until the blood flows freely. Make sure all the blood falls into the river so all the sickness will be carried away on the current. To be on the safe side, cut the tail as well. 3) Use q'icha recipe No. 1. However, the woman who suggested this grumbles that it never works. 4) Bathe the animal, especially the head, with fresh cold spring water collected in the dawn hours before the sun rises (cf. nawsa q"uyru). 5) If the illness results from a muyuy wayra, drench the sheep with vinegar.

Prevention and Control. To escape the deleterious calor of the dry season, villagers endeavor to drive their herds to pasture early in the morning before the sun is fully risen and graze them on shaded mountainsides. One man also suggests separating sick from well animals. However, since muyuy unquy is not directly transmissible, this would be a wasted effort.

Disposition of carcasses is as for kuru/uhu. Diseased brains go to the dogs, but I unfortunately failed to inquire whether they are first cooked, since cooking would break the parasitic cycle. However, some authorities state that brains and spinal cords of affected sheep should never be given to dogs. Veterinarians also advise worming all dogs every three months and destroying any strays.

Qarachi - 'Hide Disease'¹²

Also known locally as mallk'u and (Spanish) sarna, the common English term for qarachi is "mange." Camelids and ovines alike suffer greatly from both psoroptic and sarcoptic manges (produced by biting and burrowing parasites, respectively). In Quechua, qarachi glosses any type of mange. However, Usinos speak of this ill only with regard to their camelids. Although I noticed that manges are at least equally common among the village sheep, no informant remarked this fact. When queried as to the cause of their sheep's balding and ragged coats, villagers respond that the numerous stands of thorn dotting the countryside "tear off the wool" --i.e. Usinos fail to recognize this ovine affliction as another (ecto)parasitic disease. Such explanations provide yet a further, striking example of these agropastoralists' highly imperfect technological knowledge of livestock health and disease.

In sum, in Usi qarachi¹³ refers to a camelid-specific sarcoptic mange. Along with Cabrera and Yepes (1940:264), villagers also note that it is the single most serious disease that regularly attacks their treasured llama. Indeed, after q'icha, qarachi is the most commented animal ill in the community.

¹²This is probably an imperfect translation because I am uncertain of the meaning of the grammatical particle -chi, here attached to the substantive q'ara 'hide.' Normally, -chi is a causative marker for verbal radicals.

¹³As a note of historical and/or prurient interest, qarachi was once believed the source of syphilis. Supposedly, it was transmitted to Europeans via their exploits with Indian women who had also had sexual contact with Andean herdsmen rumored to be inordinately fond of their female llama!

Clinical Signs and Diagnosis. Usinos readily diagnose qarachi in its advanced stages by the symptomatic patches of balding, cracked, and split skin from which blood may ooze. Moreover, they are adept at identifying its onset when, in one informant's words, it manifests itself as "something dandruff-like" on the skin and pelt. Authorities and comuneros alike observe that qarachi attacks the extremities first -- ears, then feet, legs, and tail -- where the fiber is sparsest. From there, it may spread to the whole body. Besides the general debilities of parasitism, Usinos remark that an affected llama suffers more from the cold and wet. If all curative efforts fail, it dies within five months to a year. Finally, villagers correctly recognize that the malady is highly contagious.

Etiology. As noted, this mange results from a camelid-specific ectoparasite which eats out a web of galleries in the hide. However, folk etiology is essentially stumped here. Informants say they can see no "insect" at work. In contrast, "pure" pastoralists of neighboring Puno Department do recognize the spider-like mite of qarachi, although they believe evil winds may also sometimes produce this ill.

Most informants claim qarachi emanates from nearby pure pastoralist communities with very large herds of camelids -- a not untenable hypothesis, since ectoparasites tend to proliferate in larger bands because of camelids' habit of utilizing communal dust baths. However, when asked how or what is transmitted, Usinos' answers are vague. Some say "it" arises through direct contact

with "outsider" animals or is borne on the winds blowing from herding communities. But most villagers merely shrug their shoulders and confess total ignorance as to the source and cause of garachi. A few tentatively suggest the more general ethnoetiologies of God's will, witchcraft, evil winds, and so forth.

Treatment. Usinos spare no time or expense in curing their valuable and beloved llama. Doubtless this in part explains their relatively high success rate in treating garachi. Aggregated informant testimony implies that villagers may manage to save sixty to seventy percent of the llama thus afflicted, especially when the mange is detected early on.

However, perhaps because of the above noted uncertainties in etiology, folk cures for garachi are more varied and sometimes highly idiosyncratic. The most popular treatments are unguents of lard, cooking oil, and creosol. If these basic remedies fail, however, Usinos will turn to any number of alternatives, including purchased medicaments.

To illustrate, I recount the travails of one desperate llama owner who found four of his herd with garachi. He first resorted to an unguent, but took the added precaution of dousing the animals with diesel oil as well. With these methods, one llama recovered but the others did not. He next purchased a commercial mange cure named lexion. This rescued another llama, but the remaining two did not respond. He finally managed to restore these recalcitrants to health with a cure of his own invention. He scraped off the

cracked and split skin and then applied the contents of old radio batteries to the wounds. His rationale was that "The acid would burn away the garachi." This informant notes that an important element in all these treatments' success was the care he took to apply them only on Tuesdays and Fridays, because the disease is "weakest" on these days. Finally, this man was one of the few Usinos I talked with who made some attempt to isolate animals with a contagious disease. Since he enjoyed the use of a second corral, he quartered the sick llama there at night. By day, however, they rejoined their fellows, along with the family sheep, to be taken out to pasture.

Another informant tells how she supplemented her lard cure with a supernaturalistic one which worked to such excellent effect that not one of her herd was lost. She believes that one must not offend the disease by using its rightful name. If it is instead addressed with an intimate yet respectful term (she chose compadre), it will not afflict one's herd. She couples this belief with a simple ritual. First, she prepares a small bundle containing scab scrapings and a tuft of wool from each of the garachi-ed llama. She then carries this bundle far from the village and casts it to the winds (recall the wind-related etiology tendered above). At the same time she calls out, "Compadre, kunan ripuy sumaqla. Ama llamaykunata hap'ichu." ('Compadre, now you may go away tranquilly, i.e. without anger. Don't carry off my llama.') By speaking thus pleasantly and respectfully to the garachi, she saved her animals' lives. This, she says, was the key to her success, and not her lard applications.

While the curative value of such rituals is at best dubious, the scraping and anointing procedures may in fact be beneficial insofar as they excise the burrowing mites (and their eggs, larvae, and nymphs), soothe the wounded flesh, and prevent reinfection. Certainly, creosol, diesel fuel, battery acid, and so forth can be effective insecticides if conscientiously applied. (With commercial mange products, Fulcrand recommends three applications at 10-12 day intervals.) West (1980) reports that pure pastoralists of Puno use naturally occurring sulphur in like fashion. In sum, with an appropriate schedule of treatments, Usinos may do quite as well with their inventive home cures for garachi as veterinary science with its expensive insecticidal dips, dusts, and sprays.

Prevention and Control. Villagers say they generally endeavor to keep their camelids away from the infected herds of other comuneros and pure pastoralist communities. As noted, a few individuals may also corral their garachi-ed animals separately. But, this effort is largely wasted if the infected llama are loosed to graze with their fellows since communal dust bathing promotes the rapid spread of contagion. Aside from these techniques and the more eccentric one of "pleasant speaking," informants know of no other preventive measures. For control of garachi, veterinarians advise strict and immediate quarantine. For prevention, they recommend a once to twice yearly dip with a mange-specific disinfectant, ideally at the beginning and end of the rainy season, plus proper attention to lesions (e.g. wounds from shearing,

docking, accidents, etc.) since these invite infestation from ectoparasites. While some villagers have heard of dipping, they do not connect it with prevention of ectoparasitism. Even if they did, the costs -- in labor, cash, and sociopolitical tensions -- of constructing and provisioning dipping vats could well prove prohibitive.

Villagers say any portion of the meat affected by qarachi is inedible by humans, and is of questionable status even for dogs.¹⁴ They state such flesh is readily identified by its exceptionally ruddy hue. Some Usinos simply bury all such portions; others feed them to the dogs. Any salvageable meat is thoroughly jerked. In any case, the hide is always interred. If a llama expires in the campo, it is often left to lie where it fell until the dogs and foxes pick it clean, since at that point reportedly none of the flesh is recoverable for human use. A few, more conscientious souls may instead collect the corpse and bury it.

¹⁴Although, in a personal communication, Dr. A. F. Alexander, Professor and Head of the Department of Pathology, College of Veterinary Medicine and Biomedical Sciences of Colorado State University, disagrees with villagers here. He states that the flesh should be perfectly edible. Only the hide is affected under normal circumstances.

Punuy Unquy - 'Sleeping Sickness'

Several villagers mentioned this mysterious disease, which attacks both sheep and llama. I include it here because I strongly suspect that, like q'icha, punuy unquy glosses a wide variety of scientific etiologies, most if not all of them parasitic. Since precise scientific identification of this ailment is impossible, I merely present informants' remarks briefly here.

Clinical Signs and Diagnosis. The obvious -- the animal desires only to sleep, even to the exclusion of eating. According to one informant, her sheep would quite literally "fall over with sleep." She adds that the disease is almost always fatal. Another woman, who lost three (all over age six) of her ten llama to punuy unquy in one year, concurs with this description. One family reportedly lost some fifty of their flock of more than a hundred sheep to this ailment.

Etiology. All informants attribute this ill to witchcraft.

Treatment. Some people attempt a cure with herbal preparations. Others will even go to the expense of purchasing some sort of pills. However, no one has been successful in saving victims of punuy unquy. Even the anti-witchcraft efforts of a local paqu (curer), to whom some individuals turned in desperation, proved futile. But, one woman suspects this was because the paqu was not paid enough, and hence out of malice he allowed the animals to die.

Prevention and Control. Unknown. And, I was so fascinated by informants' accounts of this malady that I forgot to ask about disposition of carcasses.

Non-Parasitic Diseases

Usi's herds doubtless suffer from a variety of non-parasitic ailments -- e.g. various pulmonary and respiratory ills endemic to the Andes, plus conditions induced by acute vitamin and mineral deficiencies, or the foot rot mentioned by some informants but correctly viewed as a relatively minor problem. However, as noted earlier, parasitic diseases are the paramount plague of Usi's livestock. This is readily reflected in the fact that villagers found only one non-parasitic disease worthy of extended comment. Hence, it forms the sole content of this section.

Nawsa Q'uyru - 'Blind Redness'¹⁵

Here, the fit between scientific and folk designations is one-to-one. Also known as nawi unquy 'eye sickness' or simply nawsa 'blindness,' this ailment is contagious Keratoconjunctivitis, or "pink eye." Informants say it attacks only sheep, and report that in past it sometimes reached epidemic proportions. Today, however, nawsa q'uyru is not particularly frequent or alarming since villagers know precisely how to cure it.

Clinical Signs and Diagnosis. Here, for all practical purposes, Usinos' knowledge equals that of veterinary science. Informants say nawsa q'uyru first manifests itself as a cloudiness in the eye and then as a tiny spot of red which shortly grows to encompass the whole of the white. This is accompanied by burning, stinging, and excessive mucus production and tearing, such that

¹⁵Although this was the translation informants gave, I am suspicious of q'uyru.

from one day to the next the eye may become completely encrusted. Finally, if no curative steps are taken, the eye becomes ulcerated and, as one woman so graphically puts it, "It bursts." Villagers also note that nawsa q"uyru is intensely contagious. Once one sheep contracts it the entire flock is likely to follow suit, if treatment is not prompt. Although nawsa q"uyru is not itself fatal, Usinos point out that if the animal's sight becomes sufficiently obscured, it may stumble and break a leg, or tumble over a cliff to its death.

Etiology. This malady is worldwide in distribution. It results from infection by a chlamydial organism, and spreads easily and rapidly either through direct contact, aerial spraying, or on the feet of flies. The condition is exacerbated when the eye is irritated or wounded -- e.g. by dust, straw, etc.; or in lambs, by mud-caked wool around the dam's udder or by a congenitally inverted eyelid (entropion). A few Usinos recognize the role of the suggested dust/staw/etc. irritants. Quite logically, some villagers further relate nawsa q"uyru to muyuy wayra or "dust devils." However, the great majority ascribe it to excessive calor 'heat.' All agree it is most troublesome in the dry season, when there is little cloud cover and the high-altitude sun burns its hot[†] And, of course, the countryside is dustiest.)

Treatment. The logical cure for calor-induced ills is naturally frio 'cold.' Here, folk medicine prescribes icy cold water drawn from the village spring in the predawn hours before a single ray of sun has struck the spring. For extra effect,

achanqayra and q"aya q"aya juices may be added to this special water untainted by calor. With this liquid, the sheep's eyes and face are carefully and thoroughly bathed, working from muzzle to ear and tilting the head sharply back. At the same time, the eyeball is scraped with a clean fingernail. This procedure is periodically repeated until a cure is achieved. One man further suggests prefacing this treatment with a poultice of white sugar, bird droppings, and, optionally, powdered shavings from the fingernail of the left thumb. This mixture is left upon the eye for some unspecified period and then bathed away with the technique described above. He claims to have cured all his afflicted sheep thus.

While the value of such poultices is questionable, that of the bathing and scraping technique is not. Whether for the "wrong" reason, Usinos follow precisely the "right" procedure recommended by veterinary medicine in lieu of antibiotic washes, powders, and ointments. Villagers utilize the cleanest water available. (Usi's spring water can be drunk "as is," whereas the local river water is more suspect.) Doubtless, too, its coolness produces some soothing effect. And, the fingernail scraping removes irritating foreign objects. Usinos could hardly do more and, indeed, their cure rate with this technique is reportedly 100%.

Prevention and Control. Immediately they detect one animal with nawsa q"uyru, Usinos attempt to apply the above treatment to their entire flock to prevent contagion. Again, though, they note this is difficult with a large flock. But, they fail to quarantine

affected sheep. Nor do they clean and shave the belly of lactating ewes to prevent lambs' contracting the disease.

Plant Poisoning

Usinos recognize two types of plant poisoning problems in their community -- one for sheep and one for llama. Plant poisoning is a major concern in the management of animal health and disease in any range-stock operation. However, poisonous vegetation is significant not only for its effects upon animal health but also for what its quantity and distribution indicate about the state and management of grazing grounds. Pastures in which nothing but noxious vegetation is left standing constitute clear evidence of overgrazing. As the following discussion of husq'a mihuy reveals, Usi has serious problems in this regard, at least with ovines in the intermediate agrolife zone.

Husq'a Mihuy - 'Husq'a Eating'

Known in Spanish as garbancillo, the "loco weed" husq'a is of the Astragalus spp. -- thought by some to be the most destructive of poisonous plants. While other animals may suffer mild effects from husq'a mihuy, villagers observe it is generally only fatal to sheep (probably simply because of size differential). Unfortunately, say Usinos, sheep are inordinately fond of husq'a. Llama, for example, tend to avoid it in favor of other, preferred forages.

Husq'a mihuy is assuredly another of the "most talked about" animal afflictions -- and rightly so, for the community lands are rife with this noxious loco. It is especially abundant in the fallowing laymi, particularly in the lower areas closest to the nucleated settlement. By the end of the fallow period, chacras in

this region may have little other plant cover ¹⁶ -- a sure sign of intense overgrazing. Grazing grounds near to the village are the most pressured, as stockowners seek to minimize the spatial disjunctions between herding and agricultural, household, and other chores.

Clinical Signs and Diagnosis. Usinos vividly describe the most salient symptoms of husq'a mihuy. A sheep which has ingested a moderate amount of husq'a staggers and whirls about "as though it were drunken," becomes completely disoriented, but generally recovers in a day or two. If an animal has consumed a great or exclusive quantity of the weed, it evidences this behavior in more exaggerated form, may lose its vision, and shortly dies. However, muyuy unquy produces very similar effects and, pending necropsy, villagers may confound the two ailments. Again, veterinary authorities detail additional, identifying signs: trembling of the head, skittishness and hyperexciteability, flaring nostrils, aversion to flocking behavior, heat prostration, driveling, sloughing off of hooves with concomitant lameness.

¹⁶Indeed, following chacras may become so infested with husq'a that it can be mistaken for one of the community's primary crops. As an amusing anecdote, I must confess that upon hiking up to Usi for the first time, I became momentarily excited over a field full of husq'a, thinking I had perhaps discovered some rare and heretofore unknown Andean cultigen. Needless to say, when I inquired if this were the case, villagers had a jolly laugh at my expense.

Beyond noting the basic symptoms remarked above, many Usinos also avow (whether rightly or wrongly¹⁷) that, along with thorn bushes, husq'a mihuy is the other major contributor to the "peeling off" of their ovines' wool. As a final note of interest, some villagers also believe that sheep who regularly eat small quantities of husq'a grow fatter than normal.

Etiology. Usinos obviously recognize husq'a as the causative agent here. Beyond this, they aver that husq'a is a "magentic plant" which magically attracts the dull-witted sheep to it. Villagers also observe that once animals have fed heavily off husq'a, they desire to eat nothing else; i.e., along with veterinary scientists, Usinos recognize that the weed is addictive. Finally, almost all informants add that it is common for vengeful or malevolent neighbors to hex one's sheep into eating husq'a.

Treatment. Most authorities offer no feasible remedies for plant poisoning, especially under range conditions. Although there are specific antidotes for some toxins, most of the damage to tissues has already been done by the time the animal shows symptoms of poisoning. However, two potentially helpful home remedies are: 1) prevent further absorption of the toxin (oils, and to a lesser extent, eggwhite or milk, are useful in this regard); and 2)

¹⁷Although hair loss is a possible concomitant of certain types of plant poisoning in horses, cattle, and swine (Ensminger 1970:318), I am uncertain whether sheep evidence this symptom too.

promote excretion; purgatives or emetics may be employed but if administered in water they increase absorption.

Informants named only two possible cures for husq'a mihuy. One man suggested drenching with agua de acituna, but this would presumably only enhance toxin absorption. Instead, most people attempt to feed the ailing sheep quantities of ich"u and other coarse fodders to "clean out" its stomachs and intestines. While Usinos admit this ich"u cure is not always successful, they say it at least makes the meat (but not the innards) recoverable for human consumption.

Prevention and Control. Prevention of plant poisoning losses lies almost wholly within the area of range management. Usinos do take the obvious measure of keeping sheep away from pastures heavily overgrown with husq'a as much as possible. However, this usually translates "graze them at higher altitudes," and is not always practicable. Still, informants say that when a shepherd notices any incipient signs of husq'a mihuy among the flock, he/she will move them, if not to the puna, at least to a less infested area within the intermediate agrolife zone. Finally, many villagers also follow the wise strategy of grazing their sheep with other livestock (here, llama and sometimes cattle) not harmed by the particular poisonous plant, thereby reducing the overall quantities of the weed available for consumption by sheep. Aside from these basic measures, however, Usinos do not -- largely because they cannot -- follow the many further suggestions of range management for effective prevention of plant poisoning. Discussion of the dialectics of prevention is reserved to the summary remarks.

Informants state that husq'a leaves the flesh and innards of its victims with a burning, biting taste and a bizarre greenish color. When a sheep dies before the above described ich"u cure can be applied, it is considered unfit for human consumption. (Although one woman thriftily remarks that the fetuses of ewes dead of husq'a are unaffected and perfectly edible.) However, if the animal survives long enough to get a good bit of roughage through its system, then the meat can be salvaged as ch'arki and only the innards go to the dogs.

Saylla Mihuy - 'Saylla Eating'

This is simply the counterpart affliction for llama. I have no scientific information on saylla mihuy. However, the plant in question is clearly not an Astragalus, but a graceful, long-leafed affair¹⁸ which grows only in the lowest reaches of the intermediate agrolife zone and below. Whether sheep are impervious to saylla mihuy or whether they escape this malady simply because they seldom graze these areas or find other forage more palatable, I am uncertain. Burros, horses, and cattle, which do frequent the lower lands of the community, reportedly suffer little or no ill effects from saylla. Also, since it is not nearly so widespread as the noxious husq'a, fatalities are rare.

¹⁸Visual comparison with plates in Sampson (1952) suggests saylla might be one of the Zigadenus or "deathcamas" of the lily family. However, I have had no opportunity to check this with a range management specialist. Sampson writes that "The more conspicuous symptoms of poisoning by deathcamas are frothing at the mouth, nausea with vomiting, nervousness, great weakness, and finally collapse of the animal" and the "Death losses from the plant are small for cattle and horses" (1952:470).

Clinical Signs and Diagnosis. Sayllasqa llama tremble violently, drool green salilva from their jaws, and stagger about drunkenly. When these symptoms are present, the llama invariably dies within two to three hours. Informants add that the moribund creature often tries to reach home before expiring. If the animal has eaten only a small quantity of saylla, it evidences the trembling and staggering but may recover within a day. Villagers remark that the chance of recovery is greater in the wet season than the dry, although I failed to discover why. They do not believe saylla is addictive or in any way magnetic or magical.

Etiology. Usinos say the plant as a whole is not poisonous but only the powdery substance on the underside of the leaves. As for husq'a mihuy, hexing is an oft-cited "ultimate cause" of this ailment.

Treatment. Informants know of no cure. But as they point out, even if one were available, there would hardly be time to apply it.

Prevention and Control. The obvious -- try to keep your llama away from the stuff. Beyond this, Usinos take no particular preventive measures. Here, such non-action seems appropriate since, as noted, the plant is not abundant and losses are rare. I am uncertain about the disposition of carcasses.

Summary Remarks and Implications for Development

This section has two aims: to analyze the foregoing data in light of the dialectical disjunctions inherent in preindustrial agropastoralism, and to sketch out the broad implications of these disjunctions for development of pastoral productivity in such economies. The first of these tasks would benefit from comparable data on Andean, or any other, indigenous pure pastoralists because contrastive analysis would better reveal the extent to which shortcomings in peasants' veterinary management are due to the competing demands of cultivation. Such data would be especially useful in evaluating technological/informational and labor constraints -- i.e. what do pure pastoralists know and do about animal health and disease that agropastoralists don't and can't? To my knowledge, however, systematic information of this sort does not exist. Since comparative or "external" analysis is therefore infeasible, I rely here upon "internal analysis, wherever possible incorporating Usinos' own observations concerning the problematics of proper veterinary care in an agropastoral adaptation. Certainly, similar research in pure pastoralist communities is much needed.

Clinical Signs and Diagnosis

Most Usinos aptly identify the general syndrome of parasitism in their herd animals, as well as the more dramatic symptoms characteristic of the advanced stages of certain parasitic ills, e.g. muyuy unquy. However, they are less aware of other, specific signs which veterinary authorities detail. Moreover, they jumble together symptoms arising from quite different causes, both parasitic (kuru/uhu) and non-parasitic or bacterial (q'icha). Finally, some ailments also doubtless due to endoparasitism, e.g. punuy unquy, totally defy ethnodagnosis.

This general confusion in ethnodagnosis and symptomology of endoparasitism is hardly surprising. As even veterinary scientists admit, in some instances any one symptom or syndrome does not provide positive proof of a given ill. Moreover, deaths from parasitism occasionally occur suddenly and asymptotically. Often, accurate diagnoses can be made only upon microscopic examination of feces, blood, or tissues, or upon necropsy. In the latter regard, ex post facto, villagers correctly diagnose some ailments in which the parasite or its incursions are readily visible to the human eye (kuru, qallutaka, muyuy unquy, though curiously not the thread lungworms of uhu).

Usinos fare better in identifying the prodromes and symptoms of ectoparasitism -- at least in camelids. Similarly for plant poisoning, although here again ethnodagnosis may sometimes be inaccurate since the clinical signs differ little from those of certain endoparasitic (e.g. muyuy unquy) and infectious diseases.

Furthermore, villagers are just as likely to assign the characteristic "blind staggers" to supernatural causes (wayra). Finally, for some ills, e.g. nawsa q"uyru, peasant diagnostic abilities rival those of veterinary medicine.

In sum, Usino ethnodiagnoses are sometimes accurate and, particularly for endoparasitism, often understandably inaccurate. Some of this inaccuracy, however, is doubtless grounded in the agropastoral dialectic. Successful herding involves large quantities of specialized information which peasant cultivators (and certainly Usinos) may only imperfectly control. Recourse to herding specialists can mitigate such disjunctions between knowledge of agricultural and pastoral technologies, but in Usi there are no such specialists. Instead, herding duties are typically rotated among or across various members of households -- including children as young as six or seven -- in order to free more family labor for agricultural and other pursuits. Herders who are inexperienced and/or are not in daily contact with their animals have less opportunity to observe the full development of diseases and possible connections with differing pasture conditions -- e.g. husq'a-ridden, severely overgrazed, heavily infested with snails, etc. Also, working with such small (relative to pure pastoralists') herds gives little breadth in compiling complete and accurate diagnostic data on the host of ills afflicting livestock. Likewise, a low average annual slaughter rate affords few occasions for practical necropsy and the additional veterinary information to be gained thereby.

With regard to development, there is clearly room for improvement in these agropastoralists' diagnostic skills -- as in other such milieux where technological knowledge of animal health and disease is similarly limited. Better understanding of the developmental symptomology of any disease -- from initial through advanced stages, but especially initial -- allows for earlier and more positive diagnosis. In turn, appropriate management action -- whether quarantine, treatment, or immediate slaughter -- can be more promptly taken to prevent the spread of contagion and lowered offtakes due to unthriftiness. Simple and inexpensive education into the full syndromes of the principal livestock ailments in the local region can go far towards enhancing pastoral productivity. Alternatively or additionally, herding specialists may be trained and instituted where feasible.

Etiology

Usino etiologies run the gamut from supernatural Incaic ones (e.g. wayra, apu, certain forms of witchcraft), through 16th-century Spanish (calor/frio), to more "naturalistic" and modern explanations (wet and immature pastures; slugs, worms, and 'microbes'; filthy corrals and contaminated water; plant poisoning), plus a few more fanciful ideas (e.g. the activities of malevolent foreigners). They also include combinations of all the foregoing or, in some cases (qarachi, punuy unquy) little or no explanation beyond more vague, supernatural "ultimate causes."

As cautioned earlier, merely because folk etiologies (Western as well as non-Western) are semantically encoded and conceptualized

differently from scientific ones, their implications for treatment and prevention are by no means necessarily therefore invalid. As we saw for nawsa q'u'yru, the internal logic of the calor/frio theory results in a cure rate of 100%. Relatedly, "wet pasture" and "wet, filthy corral" etiologies encourage some appropriate prevention strategies of certain endoparasitic and other ills (e.g. respiratory ailments and foot rot).

Precisely for endoparasitism, however, ethnoetiologies are significantly incomplete. They consistently fail to incorporate any notion of parasitic cycles or of intermediate hosts and vectoring agents. The development implications of this lacuna are clear, and closely parallel those noted for symptomology and diagnosis above. Ignorance of intermediate hosts (kuru/uhu, qallutaka, muyuy unquy) or even of simple excremental cycles (q'icha) means peasants cannot take advantage of many of the most basic preventive measures in combating their herds' primary health problem. One must agree with Ensminger that "In order to establish effective parasite prevention and control...the flock owner must have enlightened information relative to the life history and habits of each of the most harmful parasites with which he must contend" (1970:465). Again, education in this area could considerably improve livestock "life styles" and productivity. Without doing insult to existing etiologies, development workers can explain there are additional sources of disease (dogs, snails, whatever) that must also be warded against. Provision of a useful etiology for ailments with no, or only

¹⁹Elsewhere (McCorkle 1980) I make specific extension suggestions in this regard for the Andes.

uncertain, folk explanations would be likewise beneficial and might assuage cognitive dissonance as well. Finally, development personnel obviously must consider the implications of such ethnoetiologies as "malevolent foreigners" for project extension methods.

Treatment

Informant testimony coupled with information from veterinary science seems to indicate that a number of naturalistic folk cures are always (nawsa q"uyru), often (garachi), or at least sometimes (q'icha, husq'a mihuy) successful. In some instances (muyuy unquy, saylla mihuy), villagers correctly observe that no cure is really effective or feasible. But in others, ethnoveterinary practices are largely useless (wayra, punuy unquy) or worse than useless (kuru/uhu, gallutaka).

Effective modern medicines for most of the diseases afflicting Usi's herds are commercially available in nearby Sicuani or Cuzco city. Villagers know this but, as the dialectical model predicts, they typically cannot afford such drugs. As one man succinctly explains, "I have not the economic means to obtain such remedies. My work in my chacras provides only enough for my family to eat." Yet, when all else fails, occasionally a few Usinos will turn to purchased medicaments in desperation (usually for camelids). However, informants who report doing so generally express great dissatisfaction with such preparations for a number of reasons.

First, of course, is the expense. Here peasants correctly calculate that, for ovines at least, storebought cures are

generally economically unfeasible. Due both to market factors and ethnic dominical mechanisms, Usinos can realize only S/4000-5000 on the sale of a sheep. Depending upon the quantity-price of the necessary commercial remedies, the slaughter and sale or home consumption of ailing ovines is doubtless most often the economically smartest move. Moreover, of the few informants who report such attempted cures on behalf of sheep, all say their money was thoroughly wasted anyway because the medicines worked only for a week or two, or on some animals but not others, or not at all. In part, such failures are likely due to misdiagnoses and consequent purchase of inappropriate drugs, plus imperfect understanding of directions for their application.²⁰ Some informants even swear these storebought cures are what finally killed their stock.

Villagers further complain that commercial treatments call for overly frequent applications which the peasant household cannot accommodate. Laxness in this regard almost certainly accounts for additional failures with such cures. As we have seen, however, this same complaint is also levelled at certain home remedies requiring repeated treatments (q'icha, nawsa q"uyru), especially with large herds. In dialectical terms, the many conflicting

²⁰A further dominical mechanism may be involved here, too. Misti storeowners typically foist off the oldest, shoddiest, and cheapest merchandise on Indian clients (and unsuspecting gringos, too). The drugs villagers purchase may often be well past their effective shelf-life and therefore useless.

demands of agriculture leave insufficient time and labor for proper attention to curing animal diseases. As one woman puts it, "We are always working in our chacras." Indeed, the full context of her observation summarizes many villagers' reservations regarding commercial remedies:

I bought a flask of medicine from the veterinary store to cure my sheep's diarrhea. But despite this remedy they did not get well. It cured them for one or two weeks only, after which the sickness returned. According to the directions, I was supposed to give each animal two spoonfuls a day. But I didn't have the time and so I left off the medication. We are always working in our chacras. I no longer go to the veterinary store because I don't trust their medicines. They killed one of my sheep.

In sum, Usinos enjoy a modicum of success in curing at least some livestock ills. And, although commercial remedies are generally beyond peasant means, conceivably villagers could improve cure rates somewhat with, e.g., reinforcement or enhancement of effective folk medicines, or creation of new ones utilizing cheap, locally available ingredients; added technological information on curing; use of informed herding specialists or local curers (paqu) with the time to apply this knowledge; and so forth. In the end, however, development efforts solely or even primarily along these lines would be counter-productive. Conscientious treatment with the most efficacious folk techniques or even the finest modern drugs is of little value if stock are thereafter merely turned out to infested pastures among their infected fellows and bedded in dirty, cramped, unsheltered quarters. Instead, prevention is the key to improved pastoral health and productivity.

Prevention and Control

One can do no better than to echo Ensminger's caution that "correct diagnosis and proper treatment are of little avail if preventative measures are not incorporated in the flock management" (1970:465). Nowhere is the old adage "An ounce of prevention is worth a pound of cure" more true than in management of animal health and disease, particularly since there are many livestock ailments for which no feasible remedies have yet been discovered. Veterinary scientists advise a host of measures for the general prevention and control of non-parasitic and, more especially, parasitic diseases. For convenience, I categorically review their principal suggestions as follows (compiled from Ensminger 1970:435-519).

- 1) General. Promptly isolate or slaughter animals with readily transmissible ailments. Diseased carcasses should always be disposed of properly. General sanitation (docking, tagging, disinfecting of instruments and wounds in shearing, castrating, earbranding, birthing, etc.; clean lambing areas; clean water; etc.) discourages both parasitic and non-parasitic diseases. Finally, of course, sufficient and well balanced nutrition with adequate mineral feeding year-round greatly increases resistance to all types of diseases, including plant poisoning.
- 2) Corraling. Periodically clean, sterilize, and/or rotate corrals. Provide clean, dry bedding at all times. Avoid overcrowding. Make sure the area is warm and dry.
- 3) Herd Divisions. Stock should be divided by age, sex, or reproductive state to prevent more susceptible groups from becoming infected. For example, in all the diarrheas mentioned, ideally lambs should be separated from adults and raised in drylots.

- 4) Preventive Treatments. For both parasitic and non-parasitic ills, these involves sometimes complicated annual schedules timed according to seasonal variations, parasitic life cycles, and common management operations (castrating, docking, etc.). Such measures may call for repeated drenchings, medicated feedings, vaccinations and boosters or, for ectoparasitism, dipping, spraying, or dusting with insecticides. The entire flock should always be treated simultaneously and then turned out to fresh, uninfested pastures.
- 5) Parasite Elimination. By attacking intermediate hosts or life-forms, parasites should be eliminated by breaking their life cycle before they attack livestock. Methods vary according to the disease but include, e.g., chemical dusting or spraying of rangelands, corrals, and waters; dosing and/or elimination of dogs and other carriers; and for some ectoparasites, traps, poisoned baits, etc.
- 6) Grazing Practices. Overgrazing should be strictly controlled at all times because, along with poor corral or stable conditions, it is a major contributor to continuous and epidemic parasitism. Overgrazing (plus crowding) on pastures increases parasite densities through accumulation of infected droppings. And, pastures which are "eaten down to the nub" further facilitate ingestion of harmful fauna since, for many species of parasites, "97 to 98 percent of the infective larvae are found in the bottom one inch of grass" (Ensminger 1970:485). To avert overgrazing and its concomitant --continuous reinfestation -- pastures should be systematically rotated. Animals impervious to the particular pest can be included in the rotational system. Finally, as noted earlier, humid pastures should be avoided.

For effective prevention and control of losses to plant poisoning, range management specialists recommended the following, basic strategies (from Ensminger 1970 and Sampson 1952).

- 7) As noted earlier, avoid infested areas. And,
- 8) Graze with other species of livestock unaffected by the toxic vegetation.
- 9) Provide supplemental feed during droughts, after early frosts, after wintering on dry forage, etc. before turning out to pastures known to harbor poisonous flora. "Otherwise," explains Ensminger bluntly, "hungry animals may eat poisonous plants in an effort to survive" (1970:524).

- 10) Avoid turning to pasture in early spring.²¹ A great many poisonous species, including the locos, are early growers, appearing before the more desirable forage and while the latter is still too short to afford a "good bite."
- 11) As for parasitism, know the offending species' "life history." Many plants are poisonous only at certain stages of growth and/or only if certain parts are consumed.
- (12) Eradicate toxic flora by grubbing, frequent cutting, or spraying with herbicides.
- (13) Alternatively, fence off infested pastures.
- (14) Furnish ample salt and essential minerals at all times to prevent the "depraved appetite" that leads animals to consume toxic plants.
- (15) Finally, above all else, avoid grazing ranges beyond their carrying capacity.

As we have seen in this and in other reports in the series, the majority of Usinos recognize but a handful of the above measures, and even these they practice only desultorily. Indeed, the shockingly short shrift given to prevention appears the most "irrational" aspect of these agropastoralists' veterinary management. However, the "rational rationale" behind their general inattention to prevention lies squarely in the disjunctive tensions of paleotechnic agropastoralism.

Many preventive measures are impractical for Usinos because of the low productivity of preindustrial agriculture and its corresponding inability to generate surplus capital for pastoralism. With regard to productivity, for example, 9) and 10) above are

²¹Although villagers do speak warily of early spring pasturage, they associate its dangers with pasto fresco and wetness rather than husq'a.

impossible because human food needs leave no stored, supplemental fodder for village ovines. And, precisely at the end of the long dry season, the literally starving stock must consume the first spring forage at hand. Supplemental feeds and ample salt and other essential minerals; construction and provisioning of the necessary vats and runs for preventive dipping; drugs for vaccinations, etc. or chemicals for treating rangelands and waters for parasites and poisonous plants; fencing; provision of warm, dry, sanitary and uncrowded shelters; relatedly, chemical disinfecting of quarters -- all are beyond the peasant pocketbook. Even if capital were available, most of these preventive efforts -- along with others such as herd divisions, draining of wet pastures, periodic cleaning and fresh bedding of corrals, grubbing and cutting of toxic vegetation -- would fall afoul of labor shortages for pastoralism.

Techno-informational "shortages" are equally apparent in Usino veterinary management and can also be assumed to arise at least in part from competing demands for storage and transmission of agricultural as versus pastoral lore at the level of generalized household production. Increased technical knowledge of veterinary problems might allow peasants to take more effective preventive steps, if not in outright eliminating at least in avoiding certain health hazards. E.g. for 11) and 5) above, even within the capital and labor constraints of villagers' current agropastoral adaptation, better understanding of the life cycles of poisonous plants and parasites would encourage stricter avoidance of pastures overrun with husq'a when this loco is at its toxic peak, or of pastures heavily infested with snails and other intermediate hosts.

To illustrate dialectical tensions more concretely, let us examine in depth one of the more dramatic examples of Usinos' "irrationality" in prevention -- the general failure to quarantine contagious animals. While land and labor for construction of quarantine quarters must of course be found, this basic management technique requires relatively little or nothing in the way of capital outlay -- only the necessary fencing materials, which are freely available locally (adobe, stone, thorn). We have seen that, given "extra" corrals, a few stockowners will in fact bed sick animals separately. But by day, the patients rejoin their fellows. Hence the question still remains: why no systematic quarantining?

The answer once again lies in the lack of supplemental feed and labor engendered by paleotechnic agriculture shortages. One quarantine option would be to leave diseased animals at home in the designated corral. They still require feeding, however. Since there is no stored fodder for ovines or camelids in Usi, some member of the economic unit would be obliged to forage for the ailing animals daily. This person is not likely to be the family herder since he/she already has ample gathering duties while pasturing. Instead, another family member would have to be removed from some of his/her normal agricultural and other tasks to take on the added responsibility. An alternative might be to contract some extrahousehold individual to nourish and nurse the patients, but where are such people to be found in a peasar community where nearly all households experience the same shortages? And, even if one were available, his/her hire would probably prove prohibitively

expensive. Another option might be to divide the herd into two groups, sick versus well, and pasture them separately. But this strategy runs aground of the same labor-shortage problems and, e.g. for endoparasitism, has the added disadvantage of furthering rangeland infestation.

Clearly, along with many other preventive measures, quarantining is, in perfectly rational terms, too "costly" for the peasant household to pursue systematically.²² Furthermore, if isolation is not faithfully practiced by all members of the community, its institution at the household level is fairly "irrational" since animals and their communal grazing grounds would merely continue to be reinfected by other villagers' stock. In sum, short of community-wide quarantine and other control efforts, the most rational response to readily transmissible diseases is doubtless prompt slaughter.

Yet here, again, Usinos appear somewhat less than rational to Western eyes. In principle, villagers recognize the value of prompt slaughter, if only to minimize lowered offtakes due to unthriftiness. But in practice, unless they perceive some immediate cash or consumption need, stockowners are loath to kill any animal until it is irreversibly moribund. While this "irrational" reticence has a rational basis in the multiple

²²Ultimately at issue here is the peasant ideal of household self-sufficiency. This in turn relates to Usinos' failure to aggregate animals and organize pastoralism at any level higher than a suprahousehold association of a few families. The report in this series entitled "The Socioeconomic Organization of Animal Management" focuses on this problem.

functions (e.g. "savings accounting," agricultural backstopping, manuring, prestige, etc.) of livestock in such milieux the unfortunate result, however, is overstocking and its concomitant, overgrazing.

Indeed, as all Western authorities emphasize, overgrazing is likely the major contributor to both continuous parasitism and plant poisoning. Yet because of spatial tensions between cultivation and herding, overgrazing is a given in Usi's intermediate agrolife zone. Until this problem is confronted, Usinos' failure to take many of the preventive measures suggested by Western animal science is, in one sense, highly "rational." Even if adequate capital and labor could somehow be freed from agriculture for proper corralling, preventive treatments, herd divisions, and so forth, such measures are minimally useful if stock are daily turned out to overgrazed and infested pastures.

To prevent overgrazing and its health hazards, animal science suggests a program of strict culling plus pasture rotation. Institution of such a program would therefore seem an obvious starting point for improving management of animal health and disease in economies such as Usi's. However, in a companion report we have documented the potential resistance to increased culling, and the challenges to extension of pasture rotation in such milieux. Here, it is only necessary to reiterate that changes in current practices would impact upon the very fabric of community sociostructural, political, and economic integration.

For example, in contrast to other agropastoral societies -- where decisions as to herd movements within communal lands are made communally, or where private pasture rights are recognized -- in Usi rangelands are a free good to all. Controlled rotation would therefore require concerted action at the community (or at least moiety) level, along with institutiou of new forms of social and political cooperation and enforcement. Moreover, principles of range management derived for Western-commercial, or pure-pastoral production will not apply mutatis mutandis in agro-pastoralism, if only because pastures are often fields as well. Instead, highly specialized rotational systems adapted to the particular constraints of agropastoralism in the target community may be called for. Along with the issue of "Peasant rationality," another report in this series, The Socioeconomic Organization of Animal Management, addresses such larger questions of systemic integration in preindustrial agro-pastoralism.

APPENDIX

The Animal Diseases Protocol

1. What is the Quechua name for this disease (and the Spanish equivalent, if known to informant)?
2. Which animals are affected by it?
3. Describe the effects of this disease upon the animals (i.e. the ethnosymptomology).
4. What factors do you believe cause and/or set up favorable conditions for this disease, both natural and supernatural (i.e. ethnoetiology)?
5. Is it contagious? Within and across which species?
6. Have many people's animals here been affected? How many, would you estimate? When and how recently?
7. How do you and others you know of cure this disease, again both with natural and supernatural means (i.e. ethnoveterinary practices and ethnopharmacology)?
8. What steps are taken to prevent its occurrence and/or spread?
9. Are there any additional curative or preventative measures you know of, even if you do not employ them -- e.g. purchased medicines, isolation of diseased animals, modified herding patterns, dips, etc.? Describe them.
10. If "yes" in 9 above, why do you not employ these measures?
11. How do you dispose of the diseased carcasses?
12. (Any additional information elicited at time of interview or anecdotes of informant's or others' experience with this disease.)

References Cited

- Ensminger, M.E.
1970 Sheep and Wool Science. Danville, Ill.: The
Interstate (1951) Printers and Publishers, Inc.
- Foster, George M.
1953 Relationships between Spanish-American folk
medicine. Journal of American Folklore 66:201-217.
- Sampson, Arthur W.
1952 Range Management: Principles and Practices. New
York: John Wiley & Sons.