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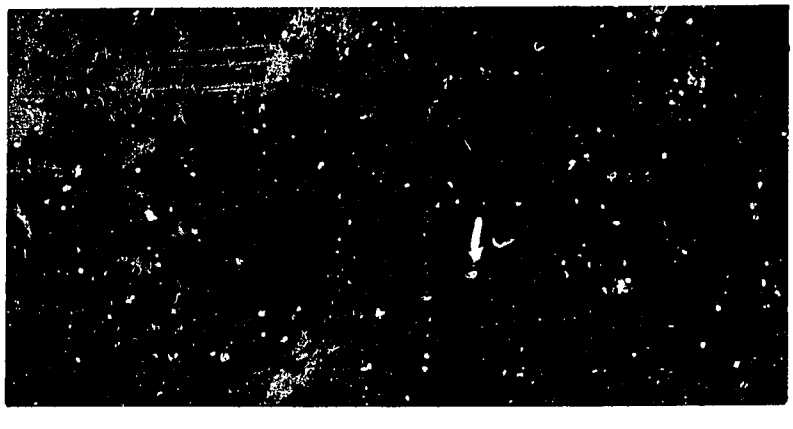

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ALPACA PRODUCTION IN PUNO, PERU

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RESUMEN

En esta publicación se presenta una colección de datos y comentarios acerca de la producción de alpaca en el departamento de Puno, Perú. En el primer capítulo, se trata sobre los censos ganaderos, especialmente los de 1978, analizándolos principalmente por provincia, especie de animal, y unidad de producción. También se incluye algunos datos a nivel de distrito.

Otro tema principal de este trabajo es la descripción de la técnica de manejo de la alpaca, utilizada por algunos de los productores del altiplano de Puno, entre ellos pastores tradicionales y criadores especializados en la producción alpaquera. El diagnóstico y el tratamiento de enfermedades, la esquila, la reproducción, el manejo de pastizales y de rebaños, y la disposición de los productos, constituyen puntos claves de esta sección.

El último capítulo trata del uso y comercialización de productos de pequeños rumiantes en Puno. Se examina las diferencias de estrategias de mercadeo que existen entre los diversos tipos de productores y de productos. Como conclusión, se la incluido algunas recomendaciones.

FORWARD

Note: My thanks to Dr. Julio Sumar, Diomedes Holgado V. and Domingo Jarra of La Raya, (IVITA), who contributed to this report.

The animal statistics presented here are probably somewhat inaccurate. They do serve, however, as a general index of herd levels and of their regional distribution within the department of Puno. The census data was obtained from the Puno office of the Ministry of Agriculture.

The altiplano region of Puno (the area which is 3,840 meters above sea level) is a major area for livestock production in Peru. Puno has approximately 4 million hectares of native pastures with an estimated 5,000,000 sheep, 450,000 head of cattle, 1,500,000 alpacas and about 2,800,000 llamas. With the advent of motorized vehicles, the number of llamas has declined as they are decreasingly used as beasts of burden. The majority of this livestock is in private hands.

Cattle Data for cattle are included in the report since in many areas they are grazed in conjunction with small ruminants, thus they are in competition with the small ruminants for pasture resources. Another reason for including cattle in this report is that their higher economic value encourages the peasantry to raise them even in areas which are better suited for small ruminant production.

The department of Puno in 1978 had a total population of 451,627 head of cattle. Of this total, 52,237 belonged to government-sponsored cooperative farms. The remaining 88 percent (399,390) was concentrated in the hands of independent producers. This category includes peasant communities and independent small and medium livestock owners. The largest percentage of the cattle

is located in the provinces of Azangaro, Chucuito, Melgar, Puno and Huancane.

Sheep The 1978 departmental sheep population consisted of 3,896,510 annimals. Government-supervised cooperatives (Empresas Asociativas) held 1,326,075 sheep, 66 percent of the total departmental population. Sheep are concentrated in the provinces of Azangaro, Melgar, Lampa and Puno.

A report states that "the departmental exploitation of sheep has a dual orientation of both meat and wool production. Sheep are of varied breeds although in the last few years production of the Corriedale breed has increased. This has resulted in the increase of the number of native sheep crossed with this breed."

Alpacas The 1978 alpaca population of the department of Puno was 1,030,318 head. Of this total 27 percent, 282,708 animals, were owned by cooperatives and the rest by independent small holders and peasant communities. The largest percentage of alpacas in the department are of the Huacaya variety, there is a much lesser number of the Suri type. A 1978 report states that alpacas are "raised mainly for fiber production as high market prices in the last few years for wool has reduced the economic feasibility of their use for meat sale."

Not until the formation of SINEA (Sistema Nacional de Estadisticas Alimentarias) in 1977, were census techniques greatly improved in the department. Most previous surveys were based on limited counts in selected areas, which were then projected to calculate the total global livestock poulation of the department. For this reason, census data prior to 1977 cannot be regarded as

very accurate. Nonetheless, they have been included in this report since they illustrate the severe livestock decrease which resulted in 1969, when the Velasco government began to expropriate private haciendas. Since the owners were paid below market prices for

Table 1. Livestock census of the department of Puno for selected years.

Year	Cattle	Sheep	Alpacas	Llamas
1966	450,000	6,200,000	2,150,000	
1967	481,000	7,000,000	2,000,000	
1968	481,000	7,200,000	2,100,000	
1969	471,000	7,100,000	2,100,000	
1970	471,000	7,000,000	2,000,000	
1971	463,500	6,200,000	1,600,000	
1972	432,000	6,200,000	1,400,000	
1973	429,700	4,923,000	1,380,000	
1974	433,100	5,050,000	1,380,000	
1975	431,500	4,970,000	1,250,000	
1976	430,500	4,970,000	1,200,000	
1977	433,755	3,813,000	945,742	267,065
1978	451,627	3,896,510	1,030,318	277,120

their animals, they opted to slaughter them before they could be confiscated by the government. Only in the last few years have animal populations began to reach the levels of the pre-reform period. The fear of future expropriations has also caused present livestock owners to limit production. This factor means livestock replacement rates are probably below those that could be obtained.

The department of Puno is divided into nine provinces. Small ruminants are produced in significant numbers in all but one of the

provinces, Sandia, which is located in the tropical lowlands. Table 2 provides animal census data for 1978 for each of the other eight provinces.

In Table 2 we see that sheep are to be found in largest numbers in the provinces of Azangaro, Melgar, Puno and Lampa. With the exception of Lampa, the majority of sheep in each province are privately owned. Lampa is an exception since it is the site of one of the largest coperative farms in Peru (CAP Gigante).

Chucuito is the major alpaca producing province in Puno, followed by Lampa, Melgar and Carabaya. As in the case with sheep, the majority of alpacas tend to be in private hands in all of the provinces listed.

Chucuito also dominates llama production in the department, having over 100,000 llamas. Azangaro, Lampa and Carabaya are the three remaining major llama production zones. Llamas are almost exclusively found in the private sector.

It is customary for herders on government cooperatives to own private herds, called waqchos. Waqcho animals are grazed together with those of the cooperative. In Table 2 waqcho animals are not included in either the cooperative or private herd categories. This omission illustrates one of the difficulties in obtaining accurate animal counts: peasants are reluctant to reveal their herd sizes. This attitude makes accurate census taking almost impossible except on government cooperatives. Table 3 provides information on the waqcho herds in five such cooperatives in the province of Huancane.

Table 2. 1978 Livestock census in the department of Puno by province

Province		Sheep	Alpacas	Llamas
Azangaro	c	331,609	44,915	237
	p	585,567	44,954	34,193
	t	917,176	89,869	34,340
Carabaya	c	68,369	24,044	---
	p	121,431	113,370	27,525
	t	189,800	137,414	27,525
Chucuito	c	29,883	12,725	98
	p	414,914	207,765	102,559
	t	444,797	220,490	102,657
Huancane	c	63,463	39,679	---
	p	342,457	74,827	18,323
	t	405,920	114,506	18,323
Puno	c	220,961	31,768	104
	p	298,840	57,954	28,918
	t	519,801	89,722	29,022
San Ramon	c	76,548	---	---
	p	124,471	5,009	5,374
	t	201,019	5,009	5,374
Lampa	c	320,960	75,977	21
	p	227,420	114,593	30,153
	t	548,380	190,570	30,174
Melgar	c	214,642	53,600	201
	p	420,291	89,142	19,462
	t	634,933	142,742	19,663

c = animals owned by cooperatives
p = animals owned privately
t = total number of animals

Table 3. Waqcho herds in selected cooperatives in the province of Huancane (Puno) in 1980

Cooperative	Sheep	Alpacas
CAP Puntia	2,985	---
CAP Combuco	2,762	455
SAIS Churura	18,879	7,815
SAIS Picotani	17,709	8,688
SAIS Huanya Capac	16,215	734
Totals	58,550	17,692

The large number of waqcho animals owned by cooperative employees illustrates the benefits of being a cooperative pastoralist. Since waqchos contribute to the problems of overgrazing, disease, and crossbreeding, some cooperatives no longer permit them. In cooperatives which continue to have waqchos, their owners could benefit from technical instruction on proper management techniques. Unfortunately, political and personal considerations hinder such efforts. This is because cooperatives have their own technical personnel who often may resent the intrusion of outsiders into their organization. However, it might also motivate them to focus more attention on waqcho animals than they presently do.

Data on the demographic composition of herds is difficult to obtain. Again, government-sponsored cooperatives are the best source of information. Tables 4 and 5 give the sex and age composition of the alpaca herds in two of the largest cooperatives in the department, SAIS Cerro Grande and CAP Gigante. Cerro Grande is located in the district of Vilquechico, province of Huancane. It has a total land area of 81,341.67 hectares of which 69,408.89

are natural pasture land. CAP Gigante is located in the district of Santa Lucia in the province of Lampa. It has a total of 221,943.54 hectares of which 199,749.19 are natural pasture land.

Table 4. Alpaca herd composition of the SAIS Cerro Grande in 1977

	Less than one year	One to two years	More than two years	Total
Wethers	2,053	1,808	4,908	9,422
Rams			653	(39.4%)
Females	1,927	1,738	10,819	14,484
				(60.6%)
Total	3,980	3,546	16,380	23,906
	(16.6%)	(14.8%)	(68.5%)	

Table 5. Alpaca herd composition of the CAP Gigante in 1977

	Less than one year	One to two years	More than two years	Total
Wethers	4,221	4,662	9,136	19,542
Rams			1,523	(41.7%)
Females	4,098	3,863	19,347	27,308
				(58.3%)
Total	8,319	8,525	30,006	46,850
	(17.8%)	(18.2%)	(64.0%)	

We have district level data for five of the provinces in the department of Puno. These are the provinces of Carabaya, Huancane, Puno, Lampa and Chucuito. However, the data for the province of Carabaya is incomplete as we have data for only 5 of its 10 districts. Furthermore, the data for this province combines cooperative and privately owned animals while that for the other provinces separates these two categories.

Table 5. District level animal census for the province of Carabaya in 1979

District	Sheep	Alpaca	Llamas
Macusani	18,416	38,129	3,784
Ayapata	2,938	339	217
Ituata	6,528	4,632	1,896
Corani	9,046	17,023	4,053
Coaza	8,446	5,556	1,719
Total	45,374	65,679	11,669

Despite a number of errors and omissions, the tables serve to illustrate the fact that livestock distribution in Puno is highly varied. Inter-district variations of livestock species are mainly a result of ecological factors. Altitudinal fluctuations exert a strong influence on Andean pastoralism. Experts regard Andean agriculture as limited to less than 3,800 meters of altitude. The Lake Titicaca basin is an exception to this rule. The lake has a warming effect which permits the production of crops at altitudes of 3,800 meters. Sheep and cattle are the most common species encountered in communites at these levels. Regions above 3,800 meters are pastoral zones. These regions are typically inhabited by people dependent on llamas and/or alpacas for their subsistence. The absence of cultivated pastures and irrigation, and the severe cold encountered in these pastoral areas greatly limit their ability to support sheep and cattle. Instead, they are ideal areas for the production of the hardier domesticated native cameloids of the Andes, the llama and the alpaca, this is especially true of alpacas. Llamas are generally

Table 6. District level animal census for the province of Puno in 1978

District		Sheep	Alpacas	Llamas
Puno	c	58,614	5,108	---
	p	20,785	1,520	2,733
	t	79,399	6,628	2,733
Accora	c	56,408	8,986	---
	p	4,899	10,962	7,262
	t	61,307	19,948	7,262
Capachica	c	---	---	---
	p	11,881	5	---
	t	11,881	5	---
Coata	c	---	---	---
	p	11,445	---	---
	t	11,445	---	---
Chucuito	c	---	---	---
	p	19,051	61	254
	t	19,051	61	254
Huata	c	---	---	---
	p	4,686	---	---
	t	4,686	---	---
Manazo	c	11,787	10,904	104
	p	25,361	6,512	3,170
	t	37,148	17,416	3,274
Plateria	t	19,352	28	168
Amanzani	t	4,814	---	---
Paucarcolla	c	80,525	127	---
	p	16,090	4,420	3,051
	t	96,615	4,547	3,051
Pichacani	c	---	---	---
	p	45,681	15,682	5,375
	t	45,681	15,682	5,375
San Antonio de Esquilache	c	---	---	---
	p	7,519	9,655	2,759
	t	7,519	9,665	2,759
Tiquillaca	c	---	---	---
	p	19,840	4,420	3,051
	t	19,840	4,420	3,051
Vilque	c	13,627	6,643	---
	p	17,376	4,658	1,092
	t	31,003	11,301	1,092
Total	c	220,961	31,768	104
	p	298,840	57,954	28,918
	t	519,801	89,722	29,022

Note: Blank places do not always mean the total absence of this species in the area. They may be present but at insignificant levels or, census data might be lacking from the area.

Table 7. District level animal census of the province of Huancane in 1978

District		Sheep	Alpacas	Llamas
Huancane	c	---	---	---
	p	73,624	---	---
	t	73,624	---	---
Cojata	c	---	---	---
	p	16,069	43,915	4,257
	t	16,069	43,915	4,257
Conima	c	---	---	---
	p	11,115	8	1,676
	t	11,115	8	1,676
Inchupalla	c	---	---	---
	p	54,988	8,356	1,913
	t	54,988	8,356	1,913
Moho	c	27,234	428	---
	p	66,120	3,816	5,100
	t	93,354	4,244	5,100
Pusi	c	---	---	---
	p	10,767	---	---
	t	10,767	---	---
Rosaspata	c	27,336	13,939	---
	p	32,333	5,121	3,004
	t	59,669	19,060	3,004
Taraco	c	---	---	---
	p	23,091	---	---
	t	23,091	---	---
Vilquechico	c	8,893	25,312	---
	p	54,350	13,611	2,373
	t	63,243	38,923	2,373
Total	c	63,463	39,679	---
	p	342,457	47,827	18,323
	t	405,920	114,506	18,323

Table 8. District level animal census for the province of Lampa in 1978

District		Sheep	Alpacas	Llamas
Lampa	c	84,240	5,851	---
	p	62,886	14,622	8,074
	t	147,126	20,473	8,074
Cabanilla	c	---	---	---
	p	31,341	3,115	1,694
	t	31,341	3,115	1,694
Calapuja	c	57,005	732	---
	p	7,456	---	269
	t	64,461	732	269
Nicacia	c	---	---	---
	p	8,630	---	370
	t	8,630	---	370
Ocuviri	c	---	---	---
	p	32,860	25,830	1,522
	t	32,860	25,830	1,522
Palca	c	---	---	---
	p	8,770	10,316	3,349
	t	8,770	10,316	3,349
Pucara	c	---	---	---
	p	28,542	2,339	1,032
	t	28,542	2,339	1,032
Santa	c	179,715	69,394	21
Lucia	p	21,660	13,478	4,083
	t	201,375	82,872	4,104
Vila	c	---	---	---
	p	8,211	11,113	2,697
	t	8,211	11,113	2,697
Paratia	c	---	---	---
	p	17,064	33,760	7,063
	t	17,064	33,760	7,063
Total	c	320,960	75,977	21
	p	227,420	114,593	30,153
	t	548,380	190,570	30,174

Table 9. District level of animal census for the province of Chucuito in 1978

District		Sheep	Alpacas	Llamas
Juli	c	15,306	1,361	---
	p	91,380	41,822	21,046
	t	106,686	43,183	21,046
Desaguadero	c	---	---	---
	p	25,798	71	4,088
	t	25,798	71	4,088
Haucullani	c	14,552	214	98
	p	48,788	12,527	18,718
	t	63,340	12,741	18,816
Ilave	c	---	---	---
	p	45,182	11,639	770
	t	45,182	11,639	770
Pizacoma	c	---	11,150	---
	p	30,220	42,196	24,403
	t	30,220	53,346	24,403
Pomata	c	---	---	---
	p	47,735	43,669	22,218
	t	47,735	43,669	22,218
Santa Rosa	c	---	---	---
de Juli	p	22,576	51,600	3,880
	t	22,576	51,600	3,880
Yunguyo	c	---	---	---
	p	27,012	12	---
	t	27,012	12	---
Zepita	c	25	---	---
	p	65,322	3,731	---
	t	65,347	3,731	---
Pilcuyo	c	---	---	---
	p	10,901	498	113
	t	10,901	498	113
Total	c	29,883	12,725	98
	p	414,914	207,765	102,559
	t	444,794	220,490	102,657

found in dry areas where ichu (bunch grass) is found in abundance. Alpacas require wet areas since they thrive on the small aquatic plants found in certain high altitude areas.

As a form of insurance and in order to meet varied domestic and market needs, peasants tend to raise simultaneously several species of livestock. Nonetheless, ecological constraints tend to tilt the numerical scales toward particular species. This observation is true especially for the highest areas. It is true that sheep are found mixed with alpacas at extremely high altitudes, but their productivity level is well below that of sheep raised at lower altitudes. From an ecological perspective, it would make far greater sense for sheep at altitudes above 4,400 meters to be replaced by alpaca. However, the higher market price of mutton and domestic sheep wool needs hinder attempts to alter current mixed grazing practices in high altitude peasant communities.

In fact, the demands of the marketplace serve to determine local pastoral strategies. This explains why cattle - whose meat has a high market value - is often raised in ecologically marginal areas. Low prices paid for alpaca wool in the international market during the depression years resulted in many haciendas shifting production almost entirely to sheep. The result of this historical trend is that sheep continue to be raised on the expropriated estates, since few alpaca were raised by the former owners at the time of expropriation. Recent increases in prices for alpaca wool have resulted in a shift toward alpaca wool

production by the cooperatives. Nonetheless, the majority of alpacas continue to be raised by smallholders. Most sheep and llamas in the department are also owned by smallholders.

Alpaca Management Practices

Introduction Alpacas are not odd looking variants of sheep. The distinctive traints of alpacas mandate different management practices than those applied to sheep. (Fernandez, 1975) Unfortunately, past neglect of alpacas by specialists in sheep and cattle has resulted in an absence of standardized guidelines to alpaca production. Until such guidelines are developed, alpaca production in Peru will continue to follow its present erratic course. The demand for production guidelines by "progressive producers" has led some to criticize the experimental station at La Raya. The present focus of I.V.I.T.A. on "pure research" issues rather than production ones generates data which often has minimal application value. Only through comparison of existing management practices will the formulation of general guidelines be possible.

A promising area for such research is the district of Macusani, province of Carabaya, Puno. In 1970, this district had an estimated alpaca population of 255,750 animals. This represented 11 percent of the total number of alpacas in the department of Puno (Bustinza, 1970:31). Located in this district is Estancia Accoyo, owned by Julio Barreda. Mr. Barreda is considered by many to produce the best quality alpaca in Peru. This is true not only in terms of wool producion, but also size, appearance and genetic control. Aware of the need for uniformity

of production practices among producers, Mr. Barreda has allowed me to publicize his management techniques in the hopes of stimulating the development of standard guides for production. The following material was provided by Mr. Barreda, who receives my thanks for his help. It must be noted that Mr. Barreda has based his observations on 35 years of experience in raising alpacas.

Barreda's Alpaca Management Calendar

September

Activity: 1. Animals dipped and moved to clean corrals

Animal health care:

1. Preventive measures against the outbreak of alpaca fever
2. Check up and treatment for mites (*sarna*)
3. Check up and treatment for *esto matitis* also known as *stomatites* (inflammation of the mouth)

October

Activity:

1. Animals moved to clean corrals
2. Weaning is initiated
3. Weaned males are castrated
4. Herds are culled for aged, diseased and unproductive animals

Animal health care:

1. Animals dosified twice against internal parasites
2. Check up and treatment for mites

3. Pastures cleaned
4. Mature females vaccinated against enterotoxemia (diarrhea)

November

Activity:
1. Animals prepared for breeding
2. Shearing of animals in certain age categories

Animal health care:
1. Pregnant females fed diet supplements
2. Treatment of mouth infections
3. Check up and treatment for diarrhea among inmature animals

December

Activity:
1. Onset of birthing

Animal health care:
1. Disinfection of navals of newborn
2. Treatment for diarrhea of newborn
3. General sanitation control

January

Activity:
1. Continuation of birthing
2. Adult animals selected for mating

Animal health care:
1. Check up and treatment for contagious diseases among newborn

February

Activity:
1. Continuation of birthing
2. Breeding

Animal health care:

1. Check up and treatment for contagious diseases among newborn and mothers

March

Activity:
1. Completion of birthing and breeding
2. Shearing
3. Sorting and packing of wool

Animal health care:

1. Animals dosified against internal parasites

April

Activity:
1. Herds culled

Animal health care:

1. Animals are dipped twice (21 days apart) for external parasites

May, June, July, August

Activity:
1. Pasture rotation
2. Processing of culled animals

Animal health care:

1. Check up and treatment for intoxication (lead trace poisoning)
2. Check up and treatment for mouth infections
3. Check up and treatment for mites
4. Check up and treatment for pneumonia
5. Check up and treatment of inflammation of the cornea (Keratitis).

Diseases and their treatment The most common external parasite that affects alpacas in Macusani is sarna (sarcoptes scabiei).

The second most common ecto-parasite is piojera (microthoracius spp). Increased use of dips and manufactured remedies has greatly reduced the severity of these parasites in recent years. Additional control of ecto-parasites consists in the periodic movement of herds into clean corrals, and the isolation of infected animals. Typical disinfectants used in dips are Nexa-dip, Cooper DGO, and Gamasol. These are also used to dip sheep and other livestock. The recommended months for dipping are those prior to and immediately following the rainy season (September-October and April-May).

The foremost disease which affects young animals (crias) is diarrhea (enterotoxemia). Diarrhea occurs most frequently in the month of February; this is the month in which the rainy season reaches its annual peak. This type of diarrhea is caused by clostridium perfringens (welchiii) types A and C and is treated by vaccinating pregnant females in October with Bacterina Triple. Newborn animals are also vaccinated. Mr. Barreda recommends early lambing to avoid births in February. He also believes that the diet of pregnant females may be a factor in the disease. Adequate pasture for pregnant animals might decrease infant suceptibility to diarrhea. Diarrhea is a common problem and appears to intensify every 3 or 4 years.

The most serious disease which affects adult alpacas in Macusani is alpaca fever. Its symptoms are loss of appetite, high temperature, infection of salivary glands and inflammation of the ear. Alpaca fever is a periodic disease which, when it occurs,

kills 20 to 30 percent of the herd. It generally occurs in the months of June and July. The last few years have seen a decline in the number of outbreaks of this disease. Alpaca fever is caused by strepticiccus pyogenes. Diseased animals are treated with injections of antibiotics. They should be isolated and kept calm as much as possible.

The most common internal parasites in Macusani are round worms. The next most frequent are flat worms. Some cases of liver fluke occur when introduced by outside animals, this disease is more prevalent at the lower altitudes where a wetter climate prevails. Another parasite which occurs only occasionally is hidatidosis. This is a larva which is transmitted through dog feces.

Internal parasites are treated with internal dosifications of commercial medicines. Ripercol and Thiebenzol are two of the most commonly used in Peru. Animals on Estancia Accoyo are treated twice annually, in October and March. Herd infestation is also controlled by rotating pastures, maintaining the corrals clean and avoiding overcrowding.

Some alpacas suffer from osteomielitis, a bone disease which results in the deformation of the lower maxillary. Affected animals have difficulty grazing and often die. One in 300 alpacas might be affected with this condition. Such animals are culled since there are no effective remedies.

Alpacas raised in higher elevations are regarded by Mr. Barreda as being healthier than ones found at lower altitudes. His

explanation for this is that those in the lower areas suffer from the rains. He feels that the snow at higher zones protects the animal from the cold by forming a blanket over it as it sleeps.

Fiber Production On Estancia Accoyo alpacas are sheared at two times of the year, November and March. Until 1950, alpacas were generally sheared every two years in Peru, usually in the month of December. In 1950, it was discovered that fiber deterioration occurs in wool that has not been sheared for two years. It was also found that this fiber was too long for some commercial uses. These functions led to the recommendation that alpacas be sheared annually.

Increased market demand for alpaca fiber did stimulate some producers to shear annually. Annual shearing does stimulate wool growth but the fibers tend to be too short for commercial use. A compromise initiated by Mr. Barreda in 1950 was to shear every 1½ years. Animals are first sheared at age 18 months. It was found that shearing on an 18 month cycle, rather than every 2 years, improves wool production by 30 percent. The duration of the annual rainy season determines the exact times at which shearing is done.

Mr. Barreda cites three reasons for shearing during the rainy season:

1. Fibers shorn at this time are softer and more flexible than those obtained during the dry season. The rains also wash the fibers, making them cleaner.
2. Animals sheared in the rainy season do not suffer from cold as much as when sheared later. The rain

also appears to stimulate the regrowth of the fibers.

3. Since breeding and lambing occur at this time, labor costs are lowered by performing all three tasks during the same general time period. The selection of animals for breeding can be done while they are being sheared.

Wool Quality There are two types of alpacas in Peru, Suri and Huacaya. There is no marked difference in body size between the two types. Wool prices received by Mr. Barreda in Macusani are the same for both varieties. This had led him to conclude that fiber quality depends on the selection of good breeding stock and not on alpaca types.

Fernandez-Baca (1975:2) states that "The Suri have very long fibers, usually attaining lengths of over 15 cm in one year's growth, which form ringlets and fall to the side of the body, giving the animal a similarity in appearance to a Lincoln sheep. The Huacaya have a more compact fleece, with shorter fibers, and are similar in appearance to Corriedale sheep. From the standpoint of textile quality, the Huacaya fiber is best."

Other informants concur with this observation, regarding the Huacaya fiber superior. This fiber is preferred by domestic consumers, but factories seem to utilize Suri wool without any problems. This, no doubt, accounts for them paying equal prices for both fibers. Seventy percent of the alpacas in Macusani are Huacayas, the rest are Suri. The reason for the greater number of

Huacaya is attributed to their greater resistence to cold weather. This difference in resistance to cold may be a result of the difference in fleece types. Since Suri wool hangs down from the body, the back of the animal may be more exposed. This feature may render the Suri variety more suitable for production at lower, warmer elevations.

Mr. Barreda makes the following observations regarding these two types:

"The common practice of mixing Suri and Huacaya herds has caused sufficient crossbreeding to make specific trait determination difficult. On my ranch, I have raised them separately however, and have made the following observations of the individual characteristics of each breed:

1. The twisted locks of Suri fiber create greater difficulties in carding.
2. It is possible that the Suri live longer than Huacaya. I have raised Suri females capable of lambing for 16 to 18 years, and 12 year old males capable of breeding. The economic life of the Huacaya is from 10 to 11 years.
3. Suri fiber growth exceeds that of the Huacaya by at least 3 cm per year. The fiber strand of the Suri is limp, shiny, with the characteristics of hair ... the strands of the Huacaya fiber are curly, less shiny, and more similar to wool in appearance. The fleece of the Suri hangs down from the animals' sides, while in the Huacaya, it is suspended almost perpendicularly from the

skin ... this results in the Suri being more exposed to the elements.

4. The meat of the Suri is leaner.

5. There is a marked difference in favor of the Huacaya in the numbers of full-term pregnancies. This difference might be attributed to the greater percentage of abortions in the Suri caused by the cold in June and July and by the drought in the months of September and October. There is also a higher mortality rate among Suri newborns, who seem more subject to diarrhea and/or pneumonia."

Wool Yields Genetically improved alpacas can be sheared in November when they are one year old. However, it is better to first shear unimproved animals at 18 months of age. Animals sheared at one year of age yield only 50 percent of the fiber that could be obtained six months later. By the third shearing, there is a yield increase of only 5 to 10 percent. From then on, the fleece yield will remain constant until age 7. Past this age, there is a slight decline in yields.

After animals reach seven years of age they are generally kept for 2 or 3 more shearings and are then culled. It has been noted that non-pregnant females produce more wool than ones of the same age that have offspring. Improved diet will also produce higher wool yields. Beginning with the first shearing, male alpacas yield more wool than females. Males used for wool production are kept until age 7 or 8, females until age 10 or more.

Current fiber yields from improved stock on Estancia Accoyo are 8 pounds for an 18 month female and 10 to 11 pounds for an 18 month male. Average quality alpaca yields are 5 pounds of fiber for females and 6 pounds for males, when sheared at 18 month intervals.

Wool Color Market demand for white fiber has fluctuated over the years. Increased demand for white fiber began at the end of 1930s. The strategy employed by the major wool buying houses in order to stimulate white fiber production was to demand that at least 15 to 20 percent of the wool sold to them by producers be white. They also paid higher prices, sometimes 3 to 4 times higher, for white fiber.

By the 1960s, the majority of the wool sold by major producers to the buying houses was white. It took 20 to 30 years for the producers to "whiten" their herds. Two factors account for this long time span. The first is the long gestation period of alpacas. The second is that the initial stock was so color-mixed that it was difficult to produce pure white animals.

The trend toward white alpaca has had unforseen consequences. These are described by Barreda (1971:33):

> "Commercial demand for white fiber caused producers to alter their breeding practices as rapidly as possible to create all-white herds. Given market requirements, this was a logical development. Unfortunately, this process should have been paired with the retention of the positive traits of colored animals.

These positive traits are a superior fleece density, sheen, and fineness. In my opinion, it is easier to "whiten" a colored herd than to augment the yield and fleece quality of a herd of Huarizos (llama-apaca hybrids). This is why in many ranches having the same number of white animals as formerly were colored, year after year the white animals produce less wool. This decline in yield is compensated by the higher prices received for white wool. Yet, the trend toward white flocks has created a double challenge: obtaining higher fiber yields and retaining the positive characteristics of colored animals. These desired improvements however, are handicapped by the lack of agreement on genetic standards between the producers. This, in turn, is a problem caused by the lack of communication between producers resulting from the isolation in which each one works.

The primitive state of alpaca production in Peru is evidenced by a lack of record keeping by the producers. Few, if any, producers maintain pedigree charts nor do they even keep records of birth dates, sex and/or age-grade weights, or carcass weights. Market requirements have stimulated some producers to keep records of the wool yields of their flocks."

Mr. Barreda does not favor current experimental attempts to improve wool quality by crossing alpacas and vicunas. Instead, he recommends that producers concentrate on crossbreeding alpacas with superior traits. He feels that the difficulty of working with vicunas, and their scarcity, makes them more of an experimental breed rather than a viable breeding stock for the typical producer.

Breeding From Barreda (1971:172):

> "The reproductive cycle of the alpaca is a slow process. Young females are first mated at 24 months and give birth at 33 months, or almost 3 years of age. Female alpacas of one year are mature enough to be bred but would give birth around age two, coinciding with their change of teeth (Typically, alpacas lose their milk teeth beginning at 28 months of age. The first to be shed are the two front teeth. By 30 months the middle teeth are replaced, and at 36 months the last ones are replaced). The difficulty of obtaining an adequate diet for alpacas grazed on native pasture during this dental transition results in underfed, weakened mothers and lambs who are subject to higher morbidity rates. Consequently, it is best to delay mating young females until they reach 2 years of age.

The process of mating and the fecundity and management of the flocks are dependent on the individual preferences of each producer, in the absence of generalized standards.

Recently, I have heard a lot about the pronounced infertility in male alpacas. This may be a product of when they were examined. Female alpacas are in heat seasonally, beginning with the onset of the rainy season and diminishing with the onset of dry weather. It is likely that sperm production in the male also follows this cycle. That is, that it peaks in January and February, declining in April and reaching its lowest level in the fall and winter. Low sperm production is accentuated when stud animals are grazed separately from the females for periods of 8 to 10 months. This causes the first few copulations to be low in fecundity with sperm counts gradually reaching adequate levels. In sum, investigators should be aware of this seasonality in sperm production and conduct their semen analysis during the peak of the mating season. Otherwise, they run the risk of examining animals during states of low sperm production.

A herd of 100 females can be efficiently serviced by 3 males, a herd of 200 would require 8

males and one of 300 about 5 percent males, or a fairly large number of males. The higher number of studies required for large herds creates problems. In large groups, fights between males are more frequent. This results in less efficient copulations and increases the incidence of damaged females. When brood herds are reduced, it is possible to control better disease by isolating sick animals, to redouble the management of healthy animals, and finally, to facilitate selection of brood stock by variety, color and type.

I have observed that the breeding period extends from November to the end of March. The result is a long period of parturition. This means hgher labor expenditures, which is uneconomical. It is also inappropriate for the obtaining of good management results. Based on personal experience I have determined that lambs born early (December-January) are stronger than ones born after March.

Late-born lambs are not only weaker, but have less opportunity to feed on the tender grasses found at the onset of the dry season. The milk supply of mothers of late-born lambs is lower for the same reason. Late-born lambs are more likely to suffer from diarrhea. Diarrhea in lambs occurs most frequently during the months of February and

March. The above observations have led me to formulate several recommendations for improving lambing:

1. Produce early lambs.
2. Shorten parturition time.
3. Utilize males during their peak period of fertility.
4. Do not maintain large numbers of brood stock in one herd."

Pasture Rotation and Herd Management

A basic management requirement of alpacas is the separation of males and females except during mating. Some producers divide their flocks into two herds; pregnant females in one and open (vacias or urhuas) in another. Other producers sort their females on the basis of color, type and breed. Those who practice the latter system do not separate pregnant from open females. Classification of animals into different herds has several advantages which are summarized below:

1. It avoids excessive handling of animals.
2. It avoids shifting animals to unfamiliar areas from whch they try to escape to return to their home pasture.
3. It facilitates the selection of animals for mating, culling, and disease treatment.
4. It aids males in selecting open females for mating thereby avoiding mounting ones already inseminated.
5. The incidence of diarrhea in newborns is lowered.

Well managed ranches should display a sex ratio of 7 females to 3 males. Eighty percent of these males should be wethers. Males used for breeding should be culled after age six. Females used for breeding should be culled after age ten. Lambs should be weaned at 11 months and segregated by sex. It is best to restrict female herd sizes to a maximum of 100 animals. On Estancia Accoyo, of every 100 inseminated females, up to 80 percent give birth, this contrasts with the average rate of 50 percent attained by most producers. There is a natural mortality rate of 15 percent among newborns between birth and 3 months of age. The word natural is used to refer to deaths caused by predators, accidents, and cold weather. Foxes are the main predators in the area. In years when diarrhea is epidemic, up to 40 percent of the newborns perish. The majority of the spontaneous abortions that occur may be attributed to the weak state of the pregnant animal. The solution to the problem of high abortion rates in alpacas thus lies in the provision of adequate fodder more than in the use of veterinary intervention.

Alpacas are normally age-graded according to the following categories:

1. Crias (lambs) 1 - 11 months.
2. Tuis (immature adults) 12 months to 23 months.
3. Adultos maduros (mature adults) 24 months and older.

A typical herd of 100 females displays the following age distribution:

Age	Percent
9 - 10 years	12
7 - 8 years	8
4 - 6 years	60
2 - 3 years	20

In general, there is a slightly higher percentage of male births. Lambs are usually weaned in the month of November. Births occur between December and March.

Males are culled for meat at age four. It is uneconomical to cull before that age as the animal has not yet reached his mature weight. Males that give good wool yields are retained until age seven or eight. If higher prices were received for alpaca meat, more producers would cull males presently kept as producers of wool. This could vacate space for more reproductive age females. However, present producers tend to maintain their male alpacas since they outyield females in wool production and alpaca meat prices are presently low.

Pastures "It seems an error that in terms of pasture consumption, one alpaca is equated with three sheep. Experience has shown that where one sheep grazes, one alpaca can be sustained. In addition, alpacas are less damaging to pastures than sheep. Land above 4,400 meters is fundamentally alpaca grazing land. It is at high altitudes that they produce best." (Barreda 1971:38)

Annual rainfall averages 300 - 500 mm in the southern Peruvian highlands. Ninety percent of the precipitation occurs in the rainy season. The marked contrast between the rainy and dry

seasons has led to a seasonal rotational system of pastures. This system consists in the division of pasture lands into two sections, one to be used during the dry season (May to October) and the other in the wet months (November to April). Some areas of the highlands have a varied microecology, marked by the presence of both dry and wet lands within the boundary of a single community. Pastoralists use the term bofedal to describe areas where surface water permits the growth of hydrophytic grasses. Typically, animals are grazed in bofedales during the dry season. Rainfall causes sprouting of fresh pastures in the dry areas where animals are grazed during the rainy season.

In areas which lack bofedales, pastoralists must reserve sections of their pasture land for exclusive dry season use. Ideally, livestock are not grazed on reserve pastures until they are needed at the peak of the dry season. Often, lack of sufficient grazing land leads to usage of reserve areas before they have had adequate time to regenerate. Soil erosion is the inevitable result of this practice.

In Macusani, the recommended land/animal ratio is one alpaca per hectare of fenced land. Dry season grazing land should be divided into four sections where the two herds are rotated. Each herd is grazed for one month in a given pasture and is then moved to another for the following month.

Sheep, llamas and other livestock should be grazed separately from alpacas. Not only does this lessen the spread of diseases, but it also prevents cross-breeding between llamas and alpacas.

The practice of mixed species grazing in peasant communities creates genetic degradation through the breeding of huarizos.

It is sound management, however, to alternate sheep, llamas and alpacas on the same grazing land. For, each species has a different dietary habit and this results in complementary grazing patterns. Alpacas tend to chew off short plants and pull on tall ones. This contrasts with sheep, who chop off grasses at ground level, often by pulling on them. This tends to destroy pasture land if frequent rotation is not practiced. Alpacas and llamas should be grazed first in a pasture which can then be opened to sheep. There are two reasons for this. One, alpacas and llamas prefer taller plants than sheep, and second, sheep will consume pasture near alpaca and llama communal defecation sites, something which the llamas and alpacas will not do.

The belief that alpacas require a diet of tough grasses in order to keep their teeth trimmed is now recognized as true only for animals with malformed jaws. Alpacas with normal dental structures can be fed softer fodder without any problems, in fact, they prefer the soft grasses found in the bofedales.

In a study (Tapia et al, 1970:82), alpacas were found to prefer a varied diet which combines both hard and soft plants. The experiment was conducted at La Raya where it was found that the grasses which alpacas consume most frequently were Festuca dolicophila (chillihua), Dystichia muscoides (cuncuna), and Scripus rigidos (totorilla). Plants consumed in lesser quanity were, Trifolium amabilis and Bromus unioloides.

Mr. Barreda contends that the native pasture found in the highlands is not replaceable by cultivated pasture. His preference for native pasture is based on two factors:

1. The high density and variety of native plants would be too costly to duplicate by cultivation, even it this was feasible.
2. The native plants are better adapted to the Andean ecology of extreme changes in ambiental temperature and moisture.

He believes that if overgrazing is prevented by pasture rotation and proper herd management, native pastures will prove sufficient. One way to improve good pasture management would be through fencing, however, the high cost of wire fences in Peru limits its use by many.

The current state of alpaca production

Not all the practices described may prove to be viable ones. Readers should be aware that at the alpaca experimental station in La Raya, other management techniques are followed. For example, at La Raya, alpaca are sheared yearly from mid-October until the first of November. The reason given is that early shearing limits the harm done to pregnant animals. Early shearing also allows the dipping of animals before the rainy season begins in December, alpacas at La Raya are sheared when they reach one year of age. Shearing is done by two-man teams who use hand shears and can shear up to 80 alpacas in 8 hours.

La Raya is also experimenting with cultivated pastures. They presently have 44 hectares seeded with mixed rye-grass and white clover. They do not see cultivated pastures as a substitute for

natural pastures. Instead, cultivated species are seen as providing useful dietary supplements. In general, one hectare of cultivated pasture will support a maximum of 16 alpacas, if these are rotated frequently between various plots.

The New Zealand-Peru technical cooperation project in Puno has also been engaged in promoting cultivated pastures. This project also views cultivated pasture as a feasible supplement, but not as a replacement of native pastures. The project has worked mainly with cooperatives but is now branching out to some highland communities. In conjunction with the Ministry of Agriculture, it has planted a 2 hectare demonstration plot in a peasant community near Macusani. It is too early to determine the success of this plot.

It appears that the issue of cultivated pastures versus native pastures is not an either or issue but rather one of how much of each. In those sites where cultivated pastures can be introduced, this should be used to supplement the diet of pregnant and lactating females and/or male breeding stock. Studies done by La Raya demonstrate that this strategic use of cultivated pastures increases alpaca production.

Regardless of individual inclination, every expert I consulted concurs that the key to alpaca improvement depends on four basic factors. These are listed below, ranked by their order of importance:

1. Adequate nutrition
2. Health (disease) control

3. Proper herd management

4. Genetics

In sum, obtaining an adequate diet is seen as the basic need of alpacas in Peru. This should be the first goal of any research project, to improve native pastures and grazing management practices in pastoral communities.

Pastoralism in Tolapalca, Puno

The Setting

The district of Manazo is located in the province of Puno, department of Puno. The district capital, Manazo, is 44 kilometers west of the city of Puno. The district of Manazo varies in altitude from 4,010 to 4,400 meters above sea level. This variation gives it two distinct ecological zones: one, a hilly highland, and the other, a lowland valley. Residents of the highlands are pastoralists. Valley-dwellers are dedicated to agricultural production. Mixed agro-pastoralism is practiced by people in both areas wherever possible. Cattle and sheep are common lowland livestock while llamas and alpacas are raised in the highlands.

The district is divided into three parcialidades (political dependencies), Chaupiayblo, Quemilluni, and Tolapalca, and two officially recognized peasant communities, Cahualla and Caricari. Based on the national census of 1972, the district of Manazo had the following population:

	male	female	total
urban population	641	614	1,255
rural population	1,615	1,864	3,479
Total	2,256	2,478	4,734

The 1980 population is estimated to have grown to 6,000 inhabitants.

History

Oral history and archeological data indicate that Manazo was the site of a flourishing meat trade in pre-Hispanic times. Cameloids were brought to the area of the present town of Manazo by inhabitants of the surrounding highlands. There, the llamas and alpacas were slaughtered at specified times of the year. The meat of these animals was then traded by the state for products from other ecological zones of the region.

In Colonial times, the inhabitants of the district were forced by the Spaniards to work in the mines of Potosi, in Bolivia. Later, they were driven off the best lands by the descendants of the Spaniards. Haciendas were built on the lands taken from the Indians, who dispossessed of their lands were forced to labor as peones of the new owners. Indian rebellions seeking to regain stolen lands were frequent but unsuccessful. To rectify such injustices, the government of Peru instituted a major land reform in 1968. Instead of returning expropriated land directly to the peasants, as was done in Bolivia after 1952, the government created cooperatives. Ideally, the population dwelling near each cooperative was to benefit from its existence. In reality, the

situation of the peasants - except for a fortunate few who are employed as herders by the cooperatives - has been changed little by this policy. The cooperatives are administered by tecnicos and other outsiders, and not by the local population. In essence, the peasants are still forced to reside in the marginal lands while the good land is now owned by the cooperatives. The staff of these new cooperatives are seen by many natives as the new hacendados.

Tolapalca

Tolapalca is a parcialidad of the district of Manazo. It is too small to be recognized as an official peasant community. The 380 residents of the parcialidad reside in kin-based homesteads distributed throughout Tolapalca. There is only one small settlement, which is located by the Tolapalca river. This hamlet is the site of a church and a primary school, but has no stores. The school has one teacher and 54 registered students, who attend grades one through six. Quechua is the dominant language of the area. Only 50 percent of the population is estimated to speak Spanish, these are mainly younger males. Some adults speak a rudimentary Spanish interspersed with Quechua.

Across the unbridged river by the hamlet of Tolapalca is a road recently built by the local residents. This road connects Tolapalca with the town of Manazo, and a detour leads to Santa Lucia. There is no regular transportation to Tolapalca, visitors must travel by jeep from Puno via the old road to Arequipa, which goes through the town of Manazo. Total time for the trip from the city of Puno to Tolapalca is between 6 and 8 hours.

Tolapalca derives its name from tola, a sage brush which abounds in the area. The area is a barren, hilly land dotted by rock formations. The primary activity of its inhabitants is pastoralism. Downriver from the hamlet are narrow banks suitable for agriculture. A few residents of Tolapalca own tiny plots of this land. These plots are transmitted generationally by inheritance and are privately owned. Their owners cultivate potatoes, quinua, barley, and a tuber called olluco. Barley is harvested green in April and fed to livestock as a supplement.

Tolapalca is known as a center of llama production, and most households own llamas. Sheep, alpacas, cattle, horses, and burros are also raised by residents.

As is typical of other Andean pastoralists, the people of Tolapalca rely on llama trade caravans for trading foodstuffs. Located between the temperate coastal valleys of Moquegua and Arequipa and the barren highlands of Puno, the people of Tolapalca have developed into middlemen in the exchange of products between the two regions. Every year llama caravans depart from Tolapalca laden with fresh meat to trade in the western coastal valleys. Recent road construction which now connects Tolapalca to the market town of Santa Lucia has diminished but not eradicated the llama caravan trade. One consequence of this decline is a shift from llama to sheep production. Mutton has a higher market value llama meat. Tolapalca residents claim that now the number of sheep in the area is equal or close to that of llamas.

Herd Management in Tolapalca

There are 15 estancias in Tolapalca. Estancias are territorial units inhabited by people linked through the male line by blood and/or marriage. Each estancia has its own name. All residents of an estancia have access to the grazing lands within its boundary. Not all estancias are equivalent in size or physical make-up; some are located in more favorable areas. Generally, the estancias with the best pasture lands are the oldest ones. Ecological variations account for estancia differentials in herd size and composition. Estancias near the river specialize in alpacas while those located in the hilltops raise mainly llamas.

Average herd sizes in Tolapalca are:

	Sheep	Alpacas	Llamas
Poor households	10-20	2-3	10-15
Medium households	35-55	12-15	40-50
Rich households	75-180	50-55	150+

Note: These herd sizes are calculated by household, not by individual owner.

Herds are always administered by households but owned individually. Only an estimated 20 percent of the residents of Tolapalca own alpacas. People who own riverland agricultural plots may have 2 or 3 cows. Cattle are raised as draft animals and for sale. Middlemen from Puno visit the area to buy cattle for transport to the slaughter houses where they are resold. Cattle must be fed barley as they do not receive sufficient nourishment from the local fodder. This barley must be purchased, unless the owner owns agricultural land where it can be raised. This fact explains why owners of cattle are mainly residents of the lower

Llamas

Almost all households in Tolapalca own llamas. The sexual composition of an average llama herd is about 60 percent female and 40 percent male. The high number of males is due to their function as pack animals. Ony male llamas are used on trade caravans as pack animals, most of then are wethers. The castrated animals are felt to be more docile yet have more stamina than the rams.

Generally, llamas are sheared only when their fiber is needed for domestic use. Llamas are valued foremost for their use as pack animals, and secondarily, as sources of meat. Llama fiber and meat have a lower market value than those of sheep. The higher general value of llamas to the household compensates for their lower market value. Llamas are also considerably larger than sheep. The majority of meat consumed in Tolapalca is from llamas. The dressed carcass of a mature male llama (4+ years) will yield between 50 to 70 pounds of meat, that of a mature female, between 40 to 50 pounds.

Wool yields for llamas sheared every few years is 4 to 6 pounds for males and 3 to 4 pounds for females. Llama fiber is used for the domestic production of ropes, bags, and other items.

Befitting their importance in the economic life of the area residents, llamas are used as ritual animals in the major religious ceremonies of Tolapalca. In some of these ocassions 5 to 6 llamas may be slaughtered in order to feed the fiesta participants. Llamas - along with other household livestock - are marked by their owners in February during carnival celebrations.

Tassels are tied to the ears of llamas and notches are made in them. The notches serve to identify the owner of each animal, the tassels are used mainly for decorative and ritual purposes.

The slaughter of a llama is an activity which requires men skilled in the art of ch'illa. Ch'illa is a traditional form of slaughter. The practitioner makes a small incision (5 to 7 cm) to the right of the sternum, directly behind the right flasting rib. He then reaches into the thoraxic cavity and breaks the aorta where it leaves the heart. The entire process takes only half a minute for a skilled practitioner to complete.

Llamas are mated in the months of February and March, about 15 days to a month after giving birth. The owners participate in the process by selecting the males - usually on the basis of size - and supervising copulation. The males selected are penned with the females once or twice a week for a period of several weeks in order to insure conception. Uncooperative females have their legs tied in a kneeling position to facilitate mounting by the male. The tendency of male llamas to compete for access to females results in male dominance hierarchies. This competition between males results in periodic battles in which females and young animals are sometimes injured. The local solution to this problem is to maintain males in one herd and females and their offspring in another. This entails having two herders per household. However, some owners with access to sufficient land will leave the males without supervision in isolated areas, checking on them only periodically. Households with few llamas will commonly castrate

most of the males and combine all animals into a single herd. This practice reduces labor requirements but eliminates control over mating. Males are castrated from one year up to three years of age.

Llama by-products used in Tolapalca are dung and lard. Llama dung is used for fuel in family hearths. Lard is used for cooking and making candles. Clearly, male llamas are the most valued animals owned by the people of Tolapalca. This may no longer be as true as it once was, but their role in community rituals demonstrates people's awareness of their dependence on the llama for their livelihood.

There is no dip in Tolapalca for use against external parasites. Construction of a dip should be a community priority as almost all livestock - including llamas - suffer from parasites. Qarachi or sarna, are the local terms for mange caused by mites. This is the major external parasite affecting llamas in Tolapalca. Informants differentiate between several classes of mange, typing them by causal agent. One common variety, Qarachi de viento, is caused by ill winds. The local cure for mites is bathing the infected animal with sulphur, which is found in the area in natural form. Lately, progressive producers have begun to use commercial disinfectants.

Some other commom illnesses are diarrhea and fever. Diarrhea in llamas is treated by feeding the animal a potion of toasted barley boiled in lemon juice. Fever is treated by bathing the ill animals in water, human urine, or a mixture of both. Sheep and

alpacas are also treated by the same methods.

Alpacas

The majority of alpacas in Tolapalca are Huacaya. This type is favored as its wool is said to be easier to shear than is the fiber from the Suri. Suris are also said to be more subject to pneumonia because of their fleece pattern.

Alpacas are sheared, as are sheep and llamas, with crude blades made of tin cans, with knives, and with an occasional store-bought hand shear. The rainy season is the main shearing period, although people will shear at any time of the year except winter when animals are at their thinnest. January and March are the two main months of shearing.

The peasants shear alpacas for the first time when they are two years of age. In the past, they sheared the alpacas every two years. Increased dependence on markets has altered this practice, and yearly shearings are now more common. Owners of large herds will divide their flocks, shearing only one-half each year. In this way, they are able to shear yearly, but only animals with two years' fiber growth. Smallholders, in comparison, will shear their alpacas yearly because of financial necessity. Not all of the herd will be sheared at one time. Unsheared animals are held in reserve for when cash is needed. When the household needs money to purchase supplies in the market, it will shear the reserve animals.

The wool is regarded as a luxury fiber, mainly destined for the market. The limited domestic use of the fiber is for the

elaboration of sweaters, saddle-bags, ropes, and women's clothing. Wool yields of mature animals are estimated to be 4 to 8 pounds for males and 3 to 6 for females. These estimates are for alpacas sheared yearly, but given the low productivity of peasant animal stocks, the figures seem more applicable to alpacas sheared every two years.

Alpaca meat is sold in peasant markets, most owners prefer not to slaughter their animals until they are past their reproductive stage. Male animals are culled when they grow too numerous. Informants state that 10 percent of their alpaca herds are males. Mature males yield 30 to 40 pounds of meat, females between 25 and 30 pounds.

Alpacas are mated in February and March. The young are born in December and January. They are mated under human supervision. Females are placed in corrals and the males are brought in one day a week for three weeks. The selection of males for mating is usually based on color type, white males are favored. The custom is to mate one male with ten females.

People prefer to raise alpacas and cattle in Tolapalca because of their market value. Only a fortunate few, however, can do so due to the absence of bofedales in the area. Only those who reside near the river are able to successfully raise alpacas, since they require fresher vegetation than llamas. Informants claim that additional reasons for the local preponderance of llamas is that the local rocky terrain is unsuited for the tender feet of the alpaca and that the alpacas are less resistant to the strong sun which bakes the hills of the area.

Sheep

In general, people seem to practice more control over llamas and alpacas than sheep. One informant comments that sheep are allowed to breed at will. Sheep flocks are composed mostly of females and young. Males not used for breeding are generally culled out for market sale. Quality of sheep tends to be uniform, mostly native stock with a few mixed Corriedales. Households are not differentiated in terms of the quality of their herds.

Sheep are sheared yearly by some and every two years by others. The frequency of shearing is dependent on the herd size and on monetary needs. Sheep are sheared in January through March. They may be sheared at any time of the year if wool is needed, but people seldom shear in the cold winter months. The wool is used locally to make ponchos. Alpaca ponchos are more common in urban areas where form is more important than function, but ponchos made of sheep's wool provide better protection against rain. The lower market value of sheep's wool tends to reinforce its use by peasants in home-made clothing. Bayeta (a locally woven fabric) pants and shirts are standard dress for men in the cold winter months.

Sheep's lard is used for cooking and candle making. The dung is used mainly for fertilizer. It is gathered from the corrals where the animals are penned at night. The trampling by the animals reduces the dung to a fine powder which is more suited for fertilizer than for burning in hearths.

It is common to observe 4 or 5 black sheep in an average herd of 40 to 50 animals. The same flock will also have various sheep

of hues varying from tan to grey. Native preference for black wool clothing helps perpetuate black sheep despite their lower market value. The animals are identified with ear notches.

Sheep are slaughtered by using a knife to slit the animal's throat. Prior to the slaughter of livestock, ritual offerings are made, these consist of burnt offerings of lard, coca leaves, and incense. Prayers are also recited requesting permission from the spirits to slaughter the animals.

The slaughter of sheep for market or domestic consumption is not limited to specific seasons of the year, the decision to slaughter depends on immediate needs. Owners prefer not to slaughter during the winter and the early spring (June to November) when scarce pastures result in severe weight losses. Dressed carcasses weigh an average of 10 to 20 pounds for mature ewes and 25 to 30 for adult rams. Because of their high market value, sheep are not slaughtered for fiesta consumption. This reflects the higher market value of mutton in comparison with llama and alpaca meat.

Males are seldom castrated. Young males are generally culled for domestic use or for sale. Some selective breeding is practiced, with the rams chosen on the basis of superior size and higher wool yield. Lambs in Tolapalca are born in two seasons: June and July, and December and January. Ewes will lamb in either of these two periods. This bimodal lambing pattern is undoubtedly a product of mixed-sex herding practices. Informants differ over the degree of selection practiced in mating livestock. Some

informants assert that more control is exercised on llamas and alpacas than on sheep. Others claim the reverse. It seems that breeding practices vary with each household. Highland dwellers with few sheep and many llamas can be expected to devote more attention to the former. Lowland dwellers who raise alpaca will mate them more carefully than sheep or llama. Midland dwellers residing in areas favorable to sheep will attend them better than the other animals.

Livestock is placed in corrals at night for protection from predators and thieves. Corrals in Tolapalca are made of loose rocks piled upon each other or of thorn bushes. At dawn, the animals are let out to graze, usually for about nine hours. In the evening, they are herded into the pens about an hour before sundown. The flock is counted when it leaves the pens in the morning and when it returns in the afternoon.

Local sheep are plagued by worms which affect the liver. Other problems are diarrhea in lambs and a liver infection which develops in malnourished animals. Mites are treated by bathing the infected parts with a mixture of lemon juice and cactus spines. In its early stages it is treated by another remedy made from retama leaves. Retama is a tree found in the temperate coastal valleys. The leaves are boiled and the water is used to bathe the infected areas of the animal. Areas most commonly infected are the exposed hairless sections of the animal.

Pasture Management

School attendance has reduced children's participation in daily pastoral chores, children now herd only on weekends and

school vacations. Men do herd, but it is women who perform most of the herding activities in Tolapalca. Members of the estancias herd their animals on communal grazing lands. Grazing rotation patterns are decided in public assemblies.

A few people in the lowland estancias have inherited rock fenced reserves of pasture land. These reserves were built in the past to provide fodder in the months of September to November. Dry weather in the winter months (June through August) bakes pastures to a dry stubble by September. Animals grazed on these barren fields reach a critical stage of malnourishment by October. The critical time for livestock in Tolapalca is not the winter, but the months following it. Weak from the malnourishment caused by poor winter feeding, the animals reach a crisis period in the months preceding the rainy season. For this reason, it is in the months of October to November that most animals die of illnesses exacerbated by their malnourished state.

The rock-fenced reserve pastures represent intrusions into communal grazing lands. These reserve pastures are not overly large, each measuring a maximum of 100 by 50 meters. Their limited size restricts their use for only those animals most seriously undernourished. Such animals are allowed to graze in them during the critical period between the end of winter and the beginning of the rainy season. It is during this time that pastures are at their worst due to overgrazing and desiccation.

Not all estancias have such privately owned reserve pastures. In estancias that do have them, not all members have access to

them. Only those who descend from the original owners have access rights. The current growth of human and animal populations has led to the demolition of reserve pastures without identifiable owners. Disputes over their use has led to a decision to destroy the unclaimed ones. No estancia member is permitted to construct new ones on communal land. Informants assert that the use of such reserves is dying out in Tolapalca.

Tolapalca has no bofedales. One estancia, Vacaria, which borders the river, does irrigate its fields with canals. The general pattern of pastoralism in Tolapalca is one of seasonal pasture rotation. In the dry season, estancia members disperse into household units to pasture their flocks in the hills on individually used grazing plots. Each estancia controls small scattered plots in the highlands and each of its households has access to one or more of these plots. Once the rains cause new grass to sprout, the herders return to the estancias where the animals are grazed together on communal lands.

Regardless of the season, household animals are grazed in close proximity to one another. Mixed herds of llamas and alpacas, or llamas and sheep, are common. Mixed herding of llamas and alpacas gives rise to numerous huarizos. Owners do prefer to separate the species but since this requires numerous herders it is seldom possible. Households with many children are more likely to be able to separate the species into different herds. In Tolapalca, animals are segregated by sex rather than species. Male llamas are generally separated from the females and their

young. On communal estancia lands, the herds are daily rotated in unison to predetermined plots. The shortage of land limits rotation cycles, plots are abandoned only for 3 or 4 days before being grazed anew.

Severe overgrazing is evidenced in Tolapalca by the proliferation of a poisonous plant species known locally as garbanzo (Astragalus). A smaller version of garbanzo is called garbancillo. These plants contain selenium, a chemical which affects animals. Informants assert that it affects sheep more severely than llamas or alpacas. Cases of selenium contamination occur most frequently in the driest months, just prior to the rainy season. Desperate by the lack of pasture, sheep are more prone to eat these plants at such times. Informants describe the symptoms by saying that the animal first staggers as if drunk, later it loses weight and finally it dies. No known cure is described by informants. The recent proliferation of this plant is a major concern for residents of Tolapalca.

As is typical of highland pastoral communities, grazing land in Tolapalca is not fenced. Each estancia-dweller knows the physical boundary markers which delimit his/her estancia. The practice of grazing animals on neighboring estancia lands is a common source of dispute in highland communities. The lack of surplus pastures also precludes the possibility of land rentals in Tolapalca.

Most households in Tolapalca are responsible for the daily supervision of their own livestock. To avoid labor duplication, estancia members will take turns watching the herds of close relatives. Herding by turno (turn) consists of a periodic rotation of herding duties between Kinswomen. Owners without access to suitable relatives, can hire temporary herders. The hiring of herders is infrequent in this cash-short society. Hired herders are mainly employed for brief periods when illness or other situations prevent the household from performing this chore. Such herders are generally paid in wool and foodstuff, and only rarely in cash.

With the disappearance of pasture reserves, households have begun to experiment by growing barley as a feed supplement. Barley has always been grown in the lowland river bottoms but is now being grown at higher elevations. It is grown in private plots fenced by rock walls. Parents of school children plant barley in the school plot for sale. This grain is fed to horses, burros, and cattle.

Livestock Ownership Patterns

Household purchases of animals to increase herd sizes are infrequent. Young adults, who journey to the coast to work as migrant laborers, spend their earnings on clothes and artifacts, not on animals. There are insufficient pasture lands to merit the investment. Mature male llama are valued at S/9,000 to S/10,000. Alpaca males sell for S/12,000 and sheep for between S/3,000 to S/4,000 for adults and S/2,000 for animals less than 2 years old. Prices for females are slightly lower. Males fetch higher prices

because of their larger size, as they are more frequently sold for meat.

Those who purchase animals locally are typically young married couples assembling their own household herd. These couples must often buy the animals from largeholders in other communities due to the reluctance of the local smallholders to part with their own meager stocks.

There are three occasions in a person's life cycle when he/she might receive animals. As children, individuals receive inyowi, which is a gift of female animals from their parents. These animals are given to young children as a means of determining their luck in the future. The animals are given to children between the ages of 3 to 14 years. The gifts usually consist of a sheep and a llama and are owned by the children but are raised with the family flocks. Only female animals are given as gifts because they can reproduce and thereby increase the child's future dowry. This gift is normally only given once, unless the animals die before reproducing. Recipients whose gift animals flourish by producing numerous offspring are considered lucky. Some may be lucky with sheep and unlucky with llamas. The measure of a person's luck with animals is taken into consideration when selecting marriage partners. Individuals dependent on llamas for their livelihood are reluctant to marry partners who have had little luck with this species. Now that alternative sources of income are available, 'animal luck' is declining as a factor in mate selection.

Upon marriage, an individual herds his/her gift animals with those of the spouse, forming a new household flock in the community. The parents and relatives of the newly married couple may add to this flock by giving a few of their own animals, such animals may be of either sex. People with large herds are more likely to present their newly married children with extra animals.

The third time a person may receive animals during the course of a lifetime is upon the death of the parents. It is customary for the youngest son, or daughter if the couple has no sons, to remain with the parents until their death. By virtue of his function as parental caretaker, the youngest son receives a larger share of the inheritance. Nonetheless, all offspring inherit a portion of the parental herd. To avoid disputes, the share of each child is specified in oral wills whenever possible.

Ambitious young couples who possess adequate pastures may opt to purchase animals in order to increase their herds. If so, they will always purchase females. Often, they must purchase stock from largeholders in other areas. Few people in Tolapalca own sufficient animals to be able to sell large numbers of females. The scarcity of cash and grazing lands in Tolapalca limits the opportunity of individuals to augment herds through purchase.

Llama Caravans

The Andes is not a timeless region inhabited by tradition-bound peasants. If the people of Tolapalca retain traditional forms of exchange, it is because these continue to fulfill present needs. By virtue of their strategic location, which straddles the

Puno and the coastal valleys, the people of Tolapalca are able to function as middlemen between two ecologially distinct regions of Peru. The intrusion of roads into the area enables them to participate in the national market system, nonetheless, most adult males participate in llama caravan trade.

There is no rigid schedule for the caravan trade. Roughly, the period for trading is between the months of December and June. In the first period, from December to April, the caravans travel to the lower coastal valley to obtain fruits. In May, the traders obtain maize and in June, they buy barley, oats, wheat and flour in the Puno valley.

Each caravan driver travels with a helper, usually a younger male relative from the same estancia. Most drivers run caravans of 10 to 20 llamas, a few travel with 30 to 40 llamas. Fifty animals is the maximum that can be handled by one person. The number of male llamas a trader owns determines the size of the caravan. Often, several members of an estancia will travel together for company and mutual help. Caravan trading is an individual affair, the animals and the cargo are kept separate by each owner while on the trail and while trading. The average driver will make two or three trips annually.

The basic item traded by the drivers is fresh meat. They trade one pound of mutton for three pounds of corn or one pound of llama for two pounds of corn. Raw wool, jerky, and textile products such as bags and ropes are also traded, but in much less quantity than the meat. The fruit obtained by the drivers is taken

to the Manazo area where it is exchanged for local products such as potatoes, quinua, broadbeans, oca (a native tuber) and other foodstuffs.

The viability of the caravan trade has persisted to the present. Although roads extend to the valleys which are visited by the caravans, motor transport has not eroded caravan trade because truck cargo is mostly restricted to non-perishable items such as rice, noodles and sugar. Caravans continue to meet the demand for meat. Similarly, the caravans supply Talapalca with the staples which cannot be produced or purchased locally. The relative scarcity of money in the area makes it unprofitable to establish stores in the area or to service it with regular motor transport, thus, the caravans represent the basic mode of supply for the area. The foodstuffs obtained in caravan trading are destined exclusively for domestic consumption. Drivers may exchange some of the items that they have obtained, such exchanges are limited to food items.

Markets

Animals constitute the basic source of revenue for people of Tolapalca. In the past, livestock was vital as a domestic source of food and material. Llamas as pack animals were used to obtain foodstuffs through trade. Livestock continues to meet these roles but also serves as an income generator through the cash sale of meat and wool. The limited number of animals owned by most households in Tolapalca restricts their participation in markets. Informants state the the fundamental use of livestock is for

domestic consumption. Only when a household has a disposable surplus, are animals marketed. Jerked meat is the basic form in which meat is consumed in Tolapalca. Llama is the most common meat eaten since it is valued less in the market.

The residents of Tolapalca have a choice of two market places: Santa Lucia and Manazo. Santa Lucia is a railhead connected by train and motor road to the cities of Juliaca and Arequipa. Middlemen congregate at the weekly Saturday market to purchase meat which they resell in Arequipa. The greater volume of trade in Santa Lucia results in more competition and higher prices for meat than in the less well-attended market of Manazo. To go to Manazo one must go by foot, bicycle, or horseback; by foot, the journey takes two days. People seldom travel to Manazo unless they have some other reasons for going. They prefer to visit the much closer market in Santa Lucia.

In April, 1980 the prices in soles of meat (per pound) at the Santa Lucia market were the following:

	Top Grade	Second Grade
Sheep	100	80
Alpaca	95	70
Llama	60	50

Note: At that time the official exchange rate was S/265 per U.S. dollar.

Only fresh meat is taken to Santa Lucia. The entrails are generally consumed locally. If taken to market, the tripe is sold for S/200, regardless of species. The head and feet of sheep are sold as a unit for S/150. Informants claim the larger heads of alpacas and llamas are also sold for S/150. The feet of these latter animals are only consumed locally.

The lower price of sheep's wool tends to restrict its use to domestic needs. Only when money is urgently needed will it be sold. Alpaca wool is used domestically but is basically produced for the market. People with 50 to 60 alpacas are able to sell three to four hundred pounds of wool. Poor households will sell only about 25 pounds.

Average wool prices per pound in Santa Lucia in April 1980 were:

	White Fiber	Color Fiber
Sheep	120	50-60
Alpaca	700	400-500
Llama	300	150

The market buyers purchase the wool from the peasants in small lots until they accumulate several hundred pounds. This wool is then shipped to Arequipa where it is sold to the major export companies.

People from Tolapalca visit the Santa Lucia market at least twice a year and at most twice a month. Generally, they travel to the market when they need to replenish their foodstocks. An average household will sell enough wool and meat to earn between S/1,000 and S/3,000. People fortunate enough to own large numbers of animals may gross S/10,000 to S/15,000 in a single trip. Most of this money is spent in the market to purchase basic necessities such as flour, maize, vegetables, sugar, rice, clothing, matches, medicines, alcohol, coca leaves and potatoes.

Increased exposure to non-traditional foods has caused changes in the peasant diet. The younger generation in particular, strives to diversify the bland local diet of potatoes and jerky with such "esoteric" items as rice and noodles. In a similar vein, coffee and tea are replacing the native beverages. Sugar, which is used to sweeten hot drinks, coca leaves, which are routinely chewed by peasants, and alcohol, which is essential for any fiesta, are all regarded as basic necessities by the rural residents. Foodstuffs and manufactured items - kerosene, stoves, radios, matches, candles, and clothing - are obtainable in markets through cash purchase.

Hides are also sold in Santa Lucia. Llama hides seem to have little demand and are rarely taken for sale. Sheep hides are the most frequent hides sold in Santa Lucia. The wool is left on the hide when it is sold. Wool buyers expect a discount for the weight of the hide when purchasing wool in this form. Alpaca hides from adult animals are sold based on the price of the wool, with a discount made for the weight of the hide. This practice seems to represent a covert type of exploitation of the producer since the skins are sometimes sold to leather factories. Alpaca lamb hides obtained from animals killed by disease or accident sell for S/1,200 for a white hide and S/800 for a colored one. No discount is made for weight for such hides since they are sold as bedspreads to the tourists.

In sum, the average resident of Tolapalca travels to market only when necessary. He/she will earn less than S/5,000 soles and

spend most of that money in the market. The improvement in quantity and quality of the livestock would increase incomes in Tolapalca through increased market sales.

Pastoralism in Cojata, Puno

Cojata

Cojata is a district of the province of Huancane, department of Puno. The province of Huancane is one of the major sites of alpaca production in the department of Puno. The 1978 departmental livestock population of the province of Huancane was 405,920 sheep, 114,506 alpacas, 18,323 llamas, and 50,158 head of cattle.

Most of the pasture land area is occupied by large cooperative ranches. The largest of these ranches is SAIS Cerro Grande. The total land area of this cooperative is 81,341 hectares. Cerro Grande has 69,408 hectares of natural pasture land and 44 hectares of cultivated pasture. In April 1980, the cooperative had 29,000 alpacas and 16,000 sheep. These figures do not include animals owned privately by cooperative employees.

The village of Cojata is a peasant community which is surrounded by cooperatives. It is reached by truck from Huancane, the ride takes more than 5 hours during the day and considerably longer at night. The inhabitants of Cojata are Aymara-speakers. In fact, most of the native population of the province of Huancane are Aymara-speakers. Many people are bilingual in Spanish and some speak Aymara, Spanish, and Quechua.

Cojata is located at an altitude of 4,530 meters above sea level. The total population of the village is 378 people. The

district of Cojata is a flat plain bordered on the east by the Andean mountains. Immediately to the east of the village is the river Suches which parallels the Bolivian frontier three kilometers away.

The small size of the village is testimony to its recent origin. The estimated age of the community is between 120 and 150 years. According to oral history, the village was founded as a stopover for rubber seekers bound for the lowlands. The village later served the same function for quinine hunters, following the collapse of the rubber boom.

The fenced lands of the SAIS Rosaspata border Cojata on the south and west, and the wire fences of SAIS Cerro Grande hem in the community on the north and east. One private estate, greatly reduced after the agrarian reform, also borders Cojata on the south. Before the agrarian reform, the villagers were able to pasture their animals on hacienda lands in return for labor services. This land is now owned by the cooperative ranches and the people of Cojata are denied access to it. One informant claims that before the reform there were 4,000 alpaca in the community, now there are only 500. Llamas were also raised by the people of Cojata before the agrarian reform, these llamas were pastured on hacienda lands.

If livestock production and llama caravan trade were the economic mainstays of Cojata prior to the agrarian reform, marketing is now the main economic base of the inhabitants. The former owners of the village stores, who also owned the large

haciendas, have left the area and sold their stores to local people. The main function of the numerous stores which are found in the village is to serve as warehouses for goods passing between the city of Juliaca and the Bolivian frontier. Store owners also purchase wool from the cooperative employees' waqcho flocks and from Bolivian producers. Every Friday there is a market by the international border. Merchants from Cojata own or lease trucks which they take to this market, and to another one held on Thursdays at a second border point 40 km away. At these markets, they sell or exchange manufactured items, such as detergent, blankets, plastic ware, and other goods, for wool from Bolivian producers. Generally, alpaca wool is higher priced on the Peruvian side. However, wool does flow in both directions across the border depending on market demand. On Mondays, 7 to 8 trucks depart Cojata loaded with wool which they transport to Juliaca. On Tuesdays or Wednesdays, the trucks return to the border markets.

The limited pasture land in Cojata and its strategic location near the Bolivian border, have created a town of entrepreneurs. Villagers unable to afford trucks and/or stores, eke out a marginal existence raising livestock, since the altitude curtails the possibility of agricultural production.

Livestock Practices

The following information represents a composite of answers that were given in response to a list of questions. All the answers were obtained in Cojata, mostly from married males who in many cases consulted their wives when answering a question. All the informants are livestock producers.

What do people do with orphan lambs?

Sheep reject their young more than llamas or alpacas. All lambs rejected by their mothers are raised by us with bottles. People buy canned milk to feed the lambs in baby bottles. They mix the milk with alfanke. This is a sweet tasting yellow-white powder you can buy in stores. Orphan lambs are called chitas, alpaca orphans are called co'qochas.

What livestock is raised in Cojata? What species is the most common one?

Alpacas are the most common stock raised in Cojata. Few llamas are raised here and no cattle. Sheep and alpacas are our main livestock.

What species do people prefer to raise? Why?

People prefer to raise alpaca for the fiber, but the lack of pastures causes most people to raise sheep instead. Lack of adequate pasture is why no one raises cattle.

When do people shear sheep, llamas and alpacas?

Sheep are sheared from February to April. Most sheep are sheared in March. Llamas are sheared in December. Alpacas are sheared in December and January.

Do producers shear all eligible animals at one time or do they reserve some for later shearing to meet cash needs?

Herds are small so people shear all their animals at one time. Sheep and alpaca are sheared yearly. Sheep are sheared the first time when they reach age two, alpacas at 18 months. Alpacas past five years of age are slaughtered for meat. People in other areas where there is more pasture land, have

larger flocks. These people shear only animals with a two years' growth of wool. Three pounds of wool is the average yield for alpacas sheared yearly.

Where do you graze your flock? In communal or private pasture land?

We graze our animals on community land. The town council keeps a list of animals owners. This is done not to collect taxes, but to insure that only residents maintain animals on community land.

Does anyone regulate grazing on communal land?

No. People graze their animals in the same areas. There isn't enough land to practice pasture rotation.

What rotation do herders practice?

The lack of pasture land limits the number of animals we can raise. We use the same site regardless of the season. Small flocks are left unattended to graze during the day. People with numerous animals have someone to supervise them as they feed. People graze their herds in close proximity but try to keep the flocks separated. Before, we could graze our animals on hacienda lands in return for labor, but the cooperatives are fenced off to us.

Do people have sufficient pasture land for their animals.

No. The lack of land limits the number of animals that we can raise.

Is land rental practiced?

No. There isn't enough land to have a surplus to rent. It all belongs to the community anyway.

What do people do who own animals but lack land?

Here this problem doesn't exist. The community owns the land and all residents have access to it.

Does the community have a sheep dip? If so, who administers it? How much is charged for dipping per sheep? per llama? per alpaca?

There is a unfinished dip built by the community under the supervision of the Ministry of Agriculture. The dip was begun three years ago but has never been finished. The town authorities have neglected to motivate people to complete the dip. It was built mainly for sheep. Peple are ignorant of how to use the dip. The plans were furnished by an engineer from the Puno office of the Ministry of Agriculture. They promised to provide us with improved sheep when the dip was ready.

If no dip is used, how do you control external parasites in your animals?

People buy DDT and rub it on animals with ticks. For mites, people bathe the infected parts of the animal with used motor oil. When they can't buy oil, they use any lubricant they can find.

What other diseases affect your sheep, llamas and alpacas in Cojata?

Sheep are subject to the wool peeling off their bodies. We believe this is caused by the heat, as it is a serious problem in June through August, in the dry season. When the rains come this problem declines. Alpaca do not suffer from <u>pelace</u> or <u>color rati</u> (wool peeling). Alpacas have worms. When an animal constantly coughs, it is a sign of worms. The internal parasites which might affect alpacas are:

1. Liver flukes, lako. This parasite attacks the liver. It is narrow, leaf-like in shape, with a thin tail. Its color is dark brown or gray-white. One other type is called warikayo. It is the same shape as the lako but its color is light grey with white. These parasites are found in humid pastures. They are a major problem in November. They ruin the meat of the animal.
2. Hichulako, this worm is found in the tripe. It has a dark brown body with a black head.
3. Fiche lako, this is a white worm found in the tripe of both sheep and alpaca. Its color and shape resemble a noodle, which gives it the descriptive name of lako fideo (noodle worm). This parasite causes the most damage in the winter months.

Do producers consume the meat from their sheep or do they sell it?

Most commonly it is consumed within the household.

Where do people sell their mutton? Is mutton sold fresh or dried?

The meat is sold locally, it is sold freshly butchered.

Do people sell alpaca or llama meat? Where?

People will sell meat from sheep, alpaca, and sometimes llamas, when they need money. Half of the carcass they will eat themselves, the other half will be sold. They sell the meat in Cojata to school teachers, policeman, truckers, and other people who do not have their own animals. May through July are peak slaughter times as the animals are fattest in these months. From August to December the animals are skinny

from lack of pasture, it is not worth it to slaughter them in these months.

Do people go on llama trade caravans in Cojata? Where? When? What products do they take to exchange? If people do not go, did they in the past? Is the number of caravans declining?

The people of Cojata no longer participate in llama caravans. Now we take trucks to Huancane and buy foodstuffs there. We no longer maintain llamas. Only people from the parcialidades continue to make llama caravan trips. They take dried sheep and alpaca meat and woven cloths. They go across the border to valleys in Bolivia.

We would go to the remote areas past the town of Ayata, to the Charasani area. The trip took two days to go and three days to return. We would trade dried meat and bayeta for maize. The exchange rate was half a sack (50 pounds) of maize for 7 <u>varas</u> (one vara equals 33 inches) of cloth. My last trip was three years ago. Some relatives loaned me llamas and we all went together. One leg of alpaca was traded for a quarter sack (25 pounds) of maize ears. One chalona (dried sheep carcass) was exchanged for one llama-load of maize kernels. Drivers would travel with a son or nephew who acted as an assistant. The average driver would take 30 to 40 llamas. Sometimes friends banded together and took up to 70 llamas. There are roads in the area now but people still go.

Do people purchase animals to augment their flocks?

No, where would they put them? People do buy animals from others to butcher for sale. They take the meat to Huancane or

Juliaca and sell it. They buy two or three sheep or alpaca, others with more capital buy up to seven or eight animals.

When are sheep, llamas and alpacas bred in Cojata?

Sheep are bred twice a year; once in June and again in November or December. Lambs are born around San Juan (24th of June) and Christmas. Some sheep give birth twice a year, others only once. If they fail to become impregnated in June, they are bred again in November or December. Llamas and alpacas mate in January and February.

Do people supervise breeding?

People select males for mating but otherwise the animals are allowed to breed at will in the fields or corrals.

What traits do people select for in choosing studs?

They choose white alpacas so the offspring will be white.

What wool colors do people prefer in their sheep, llamas, and alpacas?

We like to have black sheep, as they bring good luck, but white sheep are good for the market. No one cares about the color of llamas. Alpacas are best white but we like to raise them regardless of their wool color.

What do you feed your livestock? Cultivated or natural fodder?

They graze on natural pasture only. Some people raise small plots of barley to give to rabbits and guinea pigs. If there is a severe snow storm, they will give the barley to the sheep. The barley grown here does not produce grain. It is harvested green and stored. It is then fed periodically to the animals. Only a few people raise enough barley to give to

the sheep. Mostly it is used for the rabbits. Only sheep are given barley, not alpacas or llamas.

Who is responsible for grazing the household flocks?

The owners. Sometimes, when there is a fiesta, or when they have other chores, people will ask relatives to watch their animals. Later, they will reciprocate and take over supervision of the animals of their relatives for a few days. No one hires herders, nor do they have animals watched for shares.

Are males castrated?

Sheep, llamas and alpacas are castrated. The animal has its feet bound and the testicles are cut off with a knife. Salt is rubbed on the wound. Freshly castrated animals are not allowed to rest, they are kept moving.

Are animals separated by type, sex, age?

In Cojata we try to maintain each species separated, but as they graze they intermingle. The main thing is to separate males from the females and the young. If the herd is numerous then they are always separated, males in one bunch, females and offspring in another.

Do you classify wool types? On what basis?

In Cojata we raise only chusko sheep (native stock). We do not want Merinos. The wool from Merinos is curly and not useable for spinning. It is only useful for factories. We prefer the limp wool of our sheep which is like the wool of the Huacaya alpaca. The best llama wool is called tampo. It

is excellent for spinning. It is almost like alpaca wool. Another type of wool is called suri. It is limp and strong and makes good ropes. There are only a few Suri alpacas in Cojata. The majority of alpacas are Huacayas. The Huacaya wool is good for any type of weaving. Suri wool is good only to make rope. We call suris warillos. We sell wool from any part of the body at the same price. For domestic use, we do not use wool from the legs or neck. This wool is sold to the factory. The wool we sell is mixed from all parts of the animal.

Where do people in Cojata sell the wool from the animals?

We sell our wool to any of the stores in Cojata. Every store buys wool. There is one large wholesale buyer in town. He is a buyer for the Casa Mitchell in Juliaca. All the stores bulk wool and then sell it to him. When he gets enough wool, he takes it to the Mitchell warehouses in Juliaca.

Note: The contraband trade in Bolivian wool makes it difficult for producers or small middlemen to transport wool directly to Juliaca. For, if the local customs office stops market-bound trucks and discovers wool, fines are levied on its peasant owners if there is more wool than the guard deems appropriate. The wholesale buyer seems immune from this treatment, consequently all wool in Cojata passes through hs hands, except what little wool the producers may transport to the Huancane market.

Is there a problem with animal thefts in Cojata?

Only once in a while. The cooperatives have more trouble than we do. There are some thieves here who steal alpaca infants for the hides.

Is wool from animals used to make artisan products to sell or is it used only domestically?

It is both sold and used. We make ponchos, scarfs, blankets, etc., to sell in the fairs. We take only 4 or 5 ponchos to these fairs. Each poncho of alpaca will sell for S/4,000 to S/5,000. The owners of Juliaca and Puno tourist stores attend the fairs and purchase our products. Men use upright looms to weave ponchos, women use ground looms.

What is the average herd size of poor, medium and rich people who own livestock in Cojata?

There are only 15 households that own animals in Cojata. Only 378 people live in the community. Nine households own sheep and ten own alpacas. Poor households that own sheep have less than eight. Average households have between 15 and 30 sheep; rich families will have from 40 to 50. Of those households that own alpaca, the poor will have about 12 animals, those in the middle between 25 and 30, and the wealthy about 50. No one raises llamas in Cojata.

In a medium size sheep herd how many animals are rams? wethers? lambs? females?

People have only 2 or 3 rams per 20 head of sheep. There would be 4 to 5 wethers, fifteen females and the rest would be lambs, around 9 to 10.

What is the sex and age breakdown of an average alpaca herd?

There are very few suris. An alpaca herd of around 20 head would be comprised of two adult males used for breeding, five or six wethers raised for meat, five or six lambs and six or seven adult females.

How much does meat sell for in Cojata?

We sell our meat to the stores in town. The store owners then resell it to those people without animals. If we sell a pound of alpaca for S/90 soles to a store, it resells it for S/100, making S/10 profit. The best grade of alpaca meat will sell for S/100 a pound. People with less money purchase alpaca meat. The gentlemen (school teachers, the military, etc.) in Cojata buy only sheep meat. Mutton is more expensive. It sells for S/160 a pound. There are three grades of meat based on fat content: plump, medium, and thin. The price of meat varies according to grade.

What prices are paid for colored and white wool in Cojata?

We sell wool by the pound to the commercial buyers in Cojata. They bulk it and resell it to the Mitchell buyer. He has a truck and takes it to Juliaca. Right now (May 1980), they buy alpaca wool in Cojata for S/450 a pound for white and light fawn fleece. When the store owners resell it to the Michell representative they get S/500 a pound. Colored alpaca fleece sells for S/360 a pound to the local stores. They buy white sheep's wool for S/150 a pound. They will not buy black sheep's wool. We use the black wool for domestic clothing. (Note: in later interviews with store owners, they claimed that the current prices per pound of alpaca wool in Cojata were: S/650 for white, S/600 for light fawn, and S/350 for colored. One store buyer claimed that he only made a profit of S/20 to S/30 on each pound of wool that he resold to the local Mitchell buyer. He also stated that due to shipping

costs to Juliaca it was only profitable to ship in quantities of 500 pounds or more of wool. Taxes and transportation costs make smaller shipments unprofitable.

Do people sell sheep, llama, and alpaca hides? Where? For how much?

Yes. The buyers often request hides, so we sell them as is rather than shearing the wool off the hides. When we sell alpaca and sheep hides, the buyers demand a discount. They substract the weight of the skin and pay us only for the wool on the hide.

When you sell wool, do you clean it beforehand?

No, we sell it in pieces just as it comes off the animal. Usually it is sold mixed together in clumps of the same color. We might only sell one to three pounds at one time.

What is a hide with wool sold for?

The same price as the wool sells for.

Do you always sell wool for cash or do you exchange it for food?

No, it is always sold for cash. We then use the money to purchase foodstuffs. Often, we purchase food from the same store where we sold our wool.

Do producers sell their meat and wool to anyone or do they have regular clients?

No, they are free to sell it to anyone. We sell it to any store we choose. Some people do establish relations with particular stores and sell only to them.

How does one establish client relations with a store?

By returning always to the same store. The owners get to know you. You build up confidence between you. When he sells you

rice, sugar or noodles, he always gives you a little extra amount for trading with him. The cooperative employees who have large waqcho herds get cash advances from store owners. In return, they agree to supply the store with wool on certain dates.

Do store owners give loans to clients?

Yes, but only to largeholders. Usually they do so only with the cooperative employees.

How many times a month do people go to market to sell meat and wool?

We sell meat locally to the stores. We seldom take it to market.

What markets do you go to?

There is a small Sunday market in Cojata. It really isn't much. People go to the Sunday market in Huancane or to the Monday market in Juliaca. They usually go only to buy supplies. Most of the alpaca meat is for domestic consumption. Sheep meat is what we sell. We make the alpaca into jerky and this is what we eat most. We kill only one or two alpaca a year per household to eat. We are six in my family and we only eat one or two sheep a year. Those who raise sheep sell the meat locally to stores and eat only the guts.

What is the main problem of producers in Cojata?

The lack of pasture land. We would like to raise more animals but our pastures are insufficient.

When are alpacas and sheep weaned?

Alpaca lambs continue to nurse until the mother gives birth again. When the new lambs are born, the older ones are segregated from their mother and the newborns to prevent the older siblings from pushing aside the newborn animals. The older ones are placed in separate corrals at night or taken to a separate pasture to sleep. If a yearling alpaca persists in preventing a newborn from nursing, we tie a wooden yarn spindle on its nose. The sharp point of the spindle irritates the mother and prevents nursing by the older offspring.

Where do your livestock sleep at night?

We build corrals for both the sheep and the alpaca. In the rocky hillside we build them of stone, in the valley we make them of sod blocks.

What do you use the dung of sheep and alpaca for?

Sheep dung is collected in the corrals to use as fertilizer for the barley fields. The sheep dung becomes crushed by the hooves into a powder and is no good for fuel. We use alpaca dung to cook fires. It is gathered in the pastures.

What is the purchase price of a live alpaca in Cojata?

Most animals are bought to be slaughtered. Some people buy rams from the cooperatives to use as studs. Two year old Merino rams used for breeding are sold by the cooperative for S/5000. They sell ewes for S/3800. In Cojata, mature rams, three to four years sold for slaughter cost S/4000 and ewes S/3000. If one wants to buy alpacas for slaughter in Cojata, the asking price for white males is S/10,000. The owner will

accept S/8,000. The owner will ask S/7,800 for a white female alpaca but with bargaining the price will come down. People who desire to increase their alpaca herds buy young ones from the cooperative. The cooperatives will not sell their animals but the employees will sell their private stock. The price varies with the age of the animal. The older animals are more costly. White females from 1 to 1½ years of age sell for S/3,600 and for S/6,000 at age two. People interested in increasing herd size buy only females.

Do people construct irrigation ditches to water pasture land?

In some of the communities in this area they do. The only thing we have done in Cojata is make a small water hole for the animals.

Are animals slaughtered by fiesta sponsors in Cojata?

Yes, there is only one large fiesta when animals must be slaughtered. This is on the third of May. The sponsor has to kill seven or eight sheep and seven alpacas. On the first day, he kills only the sheep, on the second day the alpacas. To obtain the animals, if he doesn't own enough, he must buy them from others. Sometimes he may be given a few gift animals by his relatives. There is another fiesta on the 12th of October, but only one or two animals are slaughtered to eat.

Do people make cheese from sheep's milk? Do they sell it?

Some people make cheese. They make it for domestic consumption. Largeholders with 40 to 50 sheep may sell some of the cheese.

What is the price for the cheese and where is it sold?

It is sold in the plaza market in Cojata. It sells for S/100 to S/120. In the dry season when cheese is scarce the price goes up to S/200.

How do people who live in Cojata earn money?

From our animals. Sometimes we leave and work as laborers in construction projects. Other people will dedicate themselves to selling in markets. They will make food or beverages to sell. They frequent the border markets and exchange or sell goods to the Bolivians. We buy alcohol, beer, etc., from stores in Peru and take it to the border to sell. They pay us in cash or wool.

What products do livestock producers buy when they sell their meat and wool?

They might sell 4 or 5 pounds of alpaca wool. With the money they buy sugar, rice, potatoes, etc. During the shearing season we only sell half our wool. We keep the other half for our own use. The half we sell we trade at once with the local stores.

Do people give animals to relatives? When? Why?

Children are given female brood stock for the celebration of their first hair cut and their baptism. Their parents give them animals, sometimes their godparents do also. They give only one sheep and/or alpaca to each child. If the godparents do not have animals, they will give the child money. When the child matures and gets married, he or she receives these animals and their offspring from his or her parents. If a

child has luck, his gift animals will multiply. He usually will have 7 or 8 animals by the time he marries. When a child is ten, he is told which females belong to him. If the child has no luck, his animals die. Some people are lucky with sheep and unlucky with alpacas. Other people are the reverse. If a person's animals have died, then upon marriage the person must buy some, maybe her/his luck will be better with animals purchased in another area. My wife is lucky with sheep. We used to own sheep but dogs injured some, others we killed to eat. The injured ones we had to kill. Some people are lucky in business. One is born with luck for certain things. It is possible to change one's luck. If you behave correctly it brings good luck. When you marry, your parents give you a gift of sheep and/or alpacas. People inherit animals from their parents when they are too old to care for them. If you do not inherit animals, then you must buy them.

If you own large numbers of animals, does that give you more prestige in the village?

No. No one has many animals because of the lack of pasture. In the past perhaps, but not anymore. Now, prestige comes from truck or store ownership.

How and when do you mark your livestock in Cojata?

We mark our alpacas in January and the sheep in February. We mark by putting yarn on the back of the animal. We recognize our animals by their wool color. We do not need to cut their ears. Only a few largeholders make ear notches.

Do people prepare <u>sullos</u> (dried animal fetuses) for ritual use, exchange, or sale?

Sullos are made of aborted animals. They are born dead because the mother was hit during pregnancy. Locally, we sell them in the plaza if we have only one or two. The curanderos (medicine men) want them if they are alpaca. They do not want sheep fetuses. If we have several sullos we take them to the fairs to sell. People who raise crops want sheep and llama sullos for their rituals. They do not use alpaca fetuses. In the fairs, alpaca sullos sell for S/200 for the large ones (50 cm) and S/150 for small ones (20 cm). Sometimes we trade llama or alpaca sullos near Vilquechico for quinua or potatoes.

What type of pasture do sheep and alpaca like?

Sheep prefer to eat castihacho and alpacas prefer chillijauas.

Do people from Cojata leave to work elsewhere periodically? Do they purchase animals when they return?

Those who go to the coast to work seldom return, except for short visits. They never buy animals. Instead, they sell the ones they own here and leave forever. They no longer live here.

What is done with the lard from slaughtered sheep and alpacas?

The lard from sheep is used to cook. We use it to fry dough or other foods in a frying pan. The lard of alpacas is used to make candles. We melt the lard into grease by boiling it in water and pour it into a mold, we make wicks from cotton yarn. Store-bought candles are expensive, we are poor people. You can make candles of sheep fat but they don't last

as long. The best candles are made of llama or alpaca lard. We make candles from June to August. That is when we slaughter, for the animals are fattest then. When there is a drought, like this year, people slaughter many animals. They would rather kill them and sell the meat than let them die of starvation. Alpaca and sheep lard are equally used for cooking. We do not favor one over the other.

Upon the death of a person's parents, how is the inheritance decided?

When your parents die you receive part of their animals. The oldest brother divides the parental flock between all his brothers and sisters. The youngest son gets the parent's house as payment for taking care of his aged parents.

Do children inherit pasture sites from their deceased parents?

The land is owned by the community. It cannot be inherited. Children may pasture their animals in the same site used by their parents, but they do not own the site. They only use it by tradition.

Does any form of control exist in the community over the number of animals that can be pastured in one site?

No, the only control is natural. If too many animals graze in one site they become thin from lack of pasture. There is a greater chance they will become ill and die when they are weak from lack of food.

What is the domestic use of sheep and alpaca wool?

Sheep's wool is woven on upright looms into bayeta. Bayeta is used for women's dresses and men's pants and shirts. We make

underwear from floursacks. Alpaca wool is used to make bags, carrying cloths, and ponchos.

What technique is used in Cojata to kill animals?

Here, we cut the throat of the animal with a knife.

Are reserve pastures maintained and used for livestock rotation?

No, we have no pasture reserves. There is not enough pasture to have reserves. Each person is responsible for his/her own animals. We do take care in the rainy season not to let animals graze in wet areas. The humid pasture causes diarrhea in alpaca newborns. Sheep can eat wet pasture without any problems.

Are there times of the year when meat is cheaper or more expensive than average?

The main slaughter period is May, June and July. Meat is plentiful at that time and prices drop. When the animals are skinny in November and December, no one slaughters. Meat is rare in those months and consequently very expensive. The cooperatives sell meat in the rainy season, but it is expensive.

When do people shear and what quantity of wool do they get per animal. What do they use to shear with?

Sheep are sheared in March and April. We shear with a knife, only a few have hand shears. The yield from a mature ram is 4 to 5 pounds of wool. Mature females yield very little wool, only around 3 pounds or 3½ pounds. Mature male alpacas yield 6 to 7 pounds and mature females 5 to 6 pounds.

How much meat does a sheep carcass contain?

A three or four year old ram carcass will average 24 to 25 pounds of pure meat, excluding viscera. Ewes of the same age will yield an average of 20 pounds of meat, fat ones will have up to 23 or 24 pounds.

What is the average meat yield of alpacas?

Male alpacas are usually sold to be slaughtered. A mature alpaca (4 to 5 years) carcass is divided into parts. Each back leg (hind quarters) will weight 10 to 11 pounds, the front quarters weight around 9 to 10 pounds. The backbone with the rib cage weighs 10 to 11 pounds. The neck weighs 7 to 8 pounds. Plump animals yield a total of 58 to 60 pounds of meat, lean animals yield only around 45 to 47 pounds.

Are sheep docked in Cojata? With what? Are disinfectants used on the wound?

We just cut the tail off. No remedies are applied. We use a knife. If you do not dock, the animal does not grow as large. We usually dock when the animals are three to six months old.

The Marketing of Livestock Products In Puno

Peru has more than 3,000,000 alpacas, this number represents seventy percent of the total world population. This fact makes Peru the dominant world market supplier of alpaca fiber; yet, the nation does not control world market prices. This is because the lack of national textile plants means that Peru must export its alpaca fiber to the developed nations. There are three major foreign export companies in Peru which dominate the national market of alpaca fiber, these are Michell, Ricketts and Sarfati.

To change the situation, the government of Peru established its own wool buying agency in 1974. This agency is called Alpaca-Peru. Alpaca-Peru first entered the national alpaca fiber market in 1976. It purchased 12 percent of the national production of that year. The most immediate result of Alpaca-Peru's entry into the national market was an increase in prices paid to producers.

Alpaca-Peru aided producers in obtaining higher prices by bidding up the base prices of alpaca fiber. This forced the companies to offer higher prices in order to meet their fiber needs. Unfortunately, the lack of disposable capital by Alpaca-Peru prevents it from bidding-up fiber prices at all times. The result is a fluctuating market still mostly controlled by the big three buying houses.

Those most hurt by the severe shifts in market prices are the peasant households which raise the majority of alpacas in Peru. The cooperatives and some independent producers are able to produce high quality alpacas whose fiber sells for high prices even when the prices paid for peasant fiber are low.

There are an estimated 50,000 to 60,000 households (300,000 persons) in the departments of Puno, Cuzco, Arequipa, and Huancayo that produce alpacas. These peasant smallholders own over 80 percent of the alpacas in Peru. Their average income in 1975 was between S/11,000 and S/13,000. Fifty-two percent of them own less than 2 hectares of land per household.

Table 10
Alpaca Production by Size of Production Units

	Percent	Number
Cooperatives	9	271,820
Medium and small independent producers	7	211,410
Peasant communities and hamlets	84	3,020,240
Total		3,020,240

Table 11
Alpaca Population in Peru by Department

Department	Number	Percent
Puno	1,630,900	54
Arequipa	362,400	12
Cuzco	271,800	9
Ayacucho	241,600	8
Huancavelica	211,400	7
Apurimac	151,000	5
Remainder	152,040	5
Total	3,020,240	

Peru exports approximately 80 percent of the alpaca fiber that it produces, the rest is consumed internally. In 1972, seventy-two percent of the alpaca fiber exported from Peru went to Europe. The largest European customers were England, Italy, and Germany; the next two major purchasers of alpaca fiber are the United States and Japan. Nationally, wool is purchased by artisans for petty commodity production. Local use of alpaca fiber has been stimulated by the growing tourist market. In 1976 the department of Puno produced 1,080 metric tons of alpaca fiber, the cooperatives produced 265 metric tons and the waqcho herds 118.

Table 12
Alpaca fiber prices in Peru (per hundred weight)

Year	White	Light Fawn	Colored
1967	S/1,970	S/1,860	S/1,500
1970	S/2,200	S/2,100	S/1,750
1971	S/1,950	S/1,900	S/1,600
1972	S/3,000	S/2,850	S/2,400
1973	S/4,190	S/4,190	S/3,120
1975	S/3,870	S/3,870	S/3,030
1976	S/16,800	S/16,800	S/11,000
1977	S/18,000	S/18,000	S/12,900

From 1969 to 1971 there was a decline in the world demand for alpaca fiber, resulting in a glut which caused prices to drop. The decline in demand was attributed largely to shifts in fashion. The last few years have witnessed a marked increased in demand for

alpaca fiber. This pushed fiber prices up to a high of S/90,000 per hundred weight for white fiber in December 1979. However, it must be noted that the frequent devaluation of the Peruvian sol makes this currency an unreliable index of the shifts in alpaca fiber prices in the world market.

The wool purchased by the major buying companies is sorted into three categories. Type one is called alpaca finca. This grade of fiber is supplied by the cooperatives and medium sized independent producers. The fiber quality is rather high since it comes mainly from improved stock. This grade consists mainly of white fiber. Alpaca semi-finca is the second category. This fiber is supplied mostly by independent small producers. The third grade is alpaca colecta. This category of fiber represents 80 percent of the annual national production of alpaca fiber in Peru. Alpaca colecta designates the fiber that is produced by peasant communities and hamlets. Its quality is generally low and 50 percent of the total production consists of colored fiber.

Average fleece weights in La Raya are 5 pounds for mature males and 4 pounds for mature females. La Raya pre-sorts its wool before selling it for export. Employees gather the fleece shorn by the shearing teams and classify it into three piles. The classification is based on the part of the animals that the fiber comes from. The price of the fiber varies according to this classification. The best fiber, lana de finca, is shorn from the thoraxic region. The second grade, called segunda braga, is shorn from the neck, scapular and humeral regions. The lowest grade of fiber is the tercera braga. This refers to fiber from the belly

and the lower legs. In October 1979, La Raya sold the pound of white fiber to the major buying companies at S/1,200 for lana finca, S/900 for regunda braga and S/700 for tercera braga.

Peasant wool producers do not grade their fiber but sell it mixed for a base price. The difference between the prices paid for alpaca finca and alpaca colecta indicates the possible extra revenue that could be generated by the peasantry if they could improve the quality of their fiber.

Alpaca Wool Marketing

Alpaca fiber passes through several hands between the producer and the export companies. The first buyer may be an alcanzador who travels to the sites of production to purchase the wool. Alcanzadores often intercept peasants on their way to the market. Peasants who may be anxious to obtain cash or are reluctant to make a long trip to the market with a small quantity of wool, will often sell their wool on the spot to the insistent alcanzador.

Next on the middleman hierarchy are the rescatistas. These are middlemen who reside in towns or hamlets located in the centers of production. They usually own stores where they exchange goods for peasant wool.

Third in the hierarchy are the agentes or buying agents for the large export companies. The typical agente owns or leases a large warehouse in town and buys wool directly from the rescatistas. Once he has accumulated sufficient fiber, the agent trucks it to the urban office of his company. Agents receive a commission based on the amount of wool that they supply.

The final link in this chain is the export company. Upon receiving the fiber, the export company cleans and sorts the fleece and packs it.

The Tiquillaca Market

One of the most important links in this marketing structure is the local market where the wool is first bulked. The wool market in the town of Tiquillaca is such a market. Tiquillaca is the capital of the district of Tiquillaca in the province of Puno. This market is attended by people from the community of San Antonio de Esquilache. Esquilache is located to the south of Tiquillaca, in the district of San Antonio. This district is known as a center of alpaca production. The herds of an average household in this area consist of 30 to 40 sheep, 18 to 19 llamas, and 50 to 60 alpacas.

The city of Juliaca is a thriving market and industrial center in the department of Puno. The major export companies and Alpaca-Peru all have offices in Juliaca. The city has also become a center of artisan production. Consequently, it has a growing tourist business which competes with the long-established artisan market of Puno. To supply both the export houses and local artisan cottage industry, buyers from Juliaca make regular visits to market towns in the region.

In April 1980, interviews were held with several Juliaca middlemen in the market in Tiquillaca. One reported that he makes a weekly circuit of the markets. On Thursday he attends the one in Tiquillaca, on Friday he travels to the nearby market in Vilque, on Saturday he is in Santa Lucia, on Sunday in Manazo and his final

stop is on Monday, when he attends the large street market in Juliaca. There he sells the wool that he has purchased to buyers from the local artisan shops. He also owns his own shop in Juliaca where he fabricates alpaca rugs. On his market visits he purchases all varieties of wool and hides. He buys sheep's wool which he sells to artisans who weave blankets for the tourist market. The sheep hides are shorn and the hide is sold to tanneries in Juliaca.

Another trader stated that the current prices for wool in Tiquillaca were S/750 a pound for white alpaca, S/500 for white llama and S/400 for colored alpaca. Sheep hides were S/170 a pound and the fleece sold for S/100 soles per pound. Hides are more expensive since they can be sold to local leather factories in Juliaca. He explained that in peasant markets the hides of sheep, llamas, and alpacas are always sold with the wool on them. He stated that although suri and huacaya fiber are sold at the same price, that the suri fiber is preferred by factory buyers. The same informant claimed that the quality of fiber sold in markets has improved in recent years. This fact he attributed to the improved animals that are raised in the cooperatives. The cooperatives sell their production directly to the export houses, bypassing the middlemen chain. Herders who work on cooperatives, however, are free to sell their waqcho production in the local markets.

The town council in Tiquillaca charges each buyer a fee for the right to attend the market. This fee varies according to the volume capacity of each purchaser. Large scale middlemen are charged S/100 for a one day buyer's permit, retailers pay only S50.

Middlemen who attend the market regularly can purchase an annual permit for S/1,000 to S/1,500, depending on the volume of their business.

A third middleman reported that he had purchased that day about 60 sheep hides, 35 to 40 alpaca hides, and 20 to 25 llama hides. He had also bought the fleeces of 26 to 27 alpacas, 18 to 19 llamas and 25 to 30 sheep. The large number of hides sold in the Tiquillaca market result from the slaughter of animals for meat sales and/or domestic consumption by the peasant producers.

Another informant, who resides in the area, said that most middlemen who attend the market are wool buyers from Juliaca. The current prices paid for alpaca fiber were S/750 per pound for white and S/450 for colored fiber. He said that there are two wholesalers from Juliaca who attend the market every week. Each one purchases an average of 800 pounds of sheep's wool and 600 to 700 pounds of alpaca fiber every week. He added that llama wool and hides are sold less frequently than those of sheep and alpaca. He estimated that the average middleman buys around 50 pounds of llama wool and five to seven llama hides every Thursday.

Typically, peasant producers store wool to sell just before major holidays, when cash is needed for fiesta expenditures. The Tiquillaca market is flooded with wool and hides the weeks before All Saints Day, Carnival, and Easter.

Most of the wool sold in the Tiquillaca market is from peasant producers. Cooperative herders receive monthly wages which reduce their need to sell wool and/or meat frequently. In contrast, peasant producers from the surrounding highlands sell small

quantities of wool, and sometimes meat, in Tiquillaca on a regular basis. One local informant estimated that peasant households attend the Tiquillaca market every two weeks, some even weekly.

Meat

Current prices of meat per pound in the Tiquillaca market were: S/130 for alpaca, S/80 to S/90 for llama, and S/140 for sheep. Although meat is sold in Tiquillaca by the pound, it is sold by the kilogram in the city of Puno. The heads and feet of sheep are sold for S/300, the heads and feet of llamas and alpacas are seldom sold. They are consumed by the household of the producer. Similarly, the viscera of all three animals are generally not sold but are consumed by the household. Jerky is also made for domestic consumption.

There are many women from Puno who come to buy meat in the Tiquillaca market. These women are under contract to Puno restaurants to supply them with meat. They are paid on a commision basis according to the volume of meat that they bring. The same women also purchase cheese and eggs in the market to resell in Puno. The cheese in Tiquillaca is made from cow's milk. Local people have a prejudice against eating cheese made from sheep's milk, they believe that it blemishes the facial skin, consequently, they seldom make it.

One practice of meat buyers is to ambush peasant producers on their way to the market. Anxious buyers station themselves on the edge of town along the entry road used by the peasant vendors. They endeavor by various means to persuade the producers to sell their meat. This practice had led the town officials in Manazo to

consider levying fines on those caught buying meat outside of the market.

Market town residents complain that outside middlemen reduce the quantity of meat available to local buyers. Government employees and local business men who reside in market towns frequently purchase meat for domestic consumption, the presense of middlemen buyers not only drives up local prices but also reduces the quantity of meat available to them. In an effort to counteract this practice, most market towns impose a fee which is charged to outside buyers for the right to export local meat and other products from the area. Middlemen must also pay the town council for a permit to buy in the local market. These fees are merely another business expense to the major buyers, but to the small retailers such payments severely reduce their net income. Thus, the latter commonly attempt to avoid payment. This is one reason why retailers often resort to purchasing meat and other items outside of the market. Middlemen caught without having paid the necessary fees face the danger of having their purchases confiscated by the police. Sometimes the apprehended person will rectify the affair through payment of a fine or bribe.

Urban demand for meat has created a flourishing cattle breeding business in the area. Peasants in the Manazo area are given calves to raise by middlemen from Puno. The middlemen travel through the region purchasing the mature animals for slaughter in Puno. The peasant cattle raiser is paid a fee for the animal minus the original cost of the calf. Another variant of this system is for the middleman to sell the calf to the peasant and then

repurchase the animal when it is mature. The animals are all transported live to Puno where they are sold to slaughter houses by the middlemen.

Traveling Traders

Peasant livestock producers commonly reside in remote areas not reached by roads. Taking advantage of this isolation are peddlers who journey by foot to such peasant homesteads. These itinerant traders use burros to transport trade goods. Residents of remote areas typically prefer to exchange produce for goods rather than purchase them w scarce cash. The traders deal in only those items basic to peasant consumption. Typical trade items are flour, sugar, alcohol, rice, noodles, matches, coca and dyes. These goods are exchanged for wool. The trader returns to the city with the wool where he sells it. The money earned is reinvested in goods for the next trading expedition.

Although the volume of wool acquired by these petty traders is relatively small, only 1 to 3 pounds per client, their profit margin is high. The value of the wool that they acquire greatly exceeds the cost of the items exchanged for it. Rural producers are aware of this inequity but acquiesce to it since they save themselves the expense of traveling to the markets. Shrewd traders commonly establish ritual kin relationships with their clients to further cement trade ties.

Some traders obtain live animals to slaughter for meat. One such trader is a poor peasant who resides in Manazo and ekes out a marginal existence through trading. He has established casero (buyer-patron) relationships with several peasant producers who

live in the nearby highlands. Some clients he visits in their rural homesteads, others bring their already butchered animals to him in Manazo. Such clients bring an average of one or two sheep carcasses every 90 days. On his rounds to highland producers, he takes flour, chuno (freeze dried potatoes), quinua (pigweed), rice, and other trade goods. He will purchase animals with money but finds it difficult to do so as most clients prefer to barter. His average round lasts three or four days.

Sheep are the most common animal that he purchases. He also obtains live animals which he herds back to Manazo for slaughter. The viscera from these animals he consumes at home. He regards this practice as a profit since it reduces household food expenditures. The sheep carcasses he sells to caseros who visit his home every Sunday. These caseros are middlemen from Puno who purchase meat in Manazo to resell to Puno restaurants. They also sell top grade meat to wealthy families in Puno. The hides are also sold to the middlemen, who resale them to artisan shops. These hides, with wool attached, are tanned and sewn into bedspreads and wall hangings for tourists.

Casero relations are very important since they provide buyers with a constant flow of meat, and sellers with a constant market. Continued maintenance of casero ties is accomplished by giving buyers discounts and sellers favors. Market middlemen commonly purchase meat and wool from their casero suppliers at prices S/20 to S/30 less per pound than prevailing rates. In return, the peasant producer is assured of an outlet for his meat. Middlemen aid their peasant caseros in time of financial need by providing

them with cash advances. The higher status of most middlemen enables them to intervene with local officials on behalf of their peasant caseros when the latter have legal problems.

The Puno Artisan Market

Peru is rapidly gaining in popularity as an attraction for tourists. The number of tourists visiting Peru increased from 133,546 in 1970 to 338,468 in 1979. The growing influx of foreign tourists has resulted in the proliferation of artisan shops in many urban areas. Many of the original stores were owned by urbanized peasants who purchased used weavings in their home communities. Newer stores are typically owned by urban petty bourgeois merchants. To meet the growing demand, cottage artisan shops have sprung up in urban areas. The governments of Peru and Bolivia, aided by foreign development agencies, have encouraged the formation of artisan cooperatives as a strategy for reducing unemployment. The most popular product of these artisan shops are alpaca sweaters. These sweaters are also knitted by a myriad of rural households as a means of supplementing their incomes. Informants claim that in the fiber market of Juliaca, buyers from the artisan shops will pay more for alpaca wool than the large export houses. In return, they obtain the best quality wool.

Puno is one of the major tourist sites in Peru. The majority of its present day inhabitants are migrants from the surrounding rural provinces. Billed as the folklore capital of Peru, Puno is increasingly dependent on tourism for its economic survival. The availability of native artisan goods is one of the attractions which draws tourists.

Numerous tourist stores exist in Puno, but the majority of budget travelers shop in the street stalls near the Post Office. The volume of business of these stalls flucuates with the ebb and flow of tourists. The peak months are June through September. There are over twenty street stalls which offer rugs, sweaters, ponchos, wall hangings, pillow cases, and handbags for sale. These booths are owned by rural migrants or their relatives. It is common for booths to be managed by the relatives of an owner. In fact, four or five families own the majority of stalls in the market. This ownership monopolization insures the uniformity of prices from booth to booth. The booths are visited daily by peasants with sweaters which they sell to the booth managers. Tourist stores are also supplied in this manner.

An informant discussed this system in the following manner:

> "Peasants in these areas own only small parcels of land and/or a few animals. To earn money, they purchase a few pounds of alpaca wool in Ilave or Juliaca and use the wool to knit sweaters which they sell to tourist stores. They then use the money to reinvest in more wool to make sweaters. Most of my suppliers are from the countryside, not from the city. I tell them what style of sweater to knit according to what customers prefer to buy. One hundred percent of the knitters are women. They visit my shop every week and bring 2 to 3 sweaters to sell. I give cash advances or wool to my regular clients. When business is slack, they give me the finished sweaters on consignment and must wait for payment until they are sold.

Machine-made sweaters are produced in shops in Puno and Juliaca. These factory sweaters are produced by private companies. Some of the rustic, hand-knit sweaters I get are made by cooperatives or associations. The associations were organized under the Velasco government by sociologists employed by SINAMOS in response to local artisans demands. Once there were 22 associations. Governmental support of these associations declined under the administration of Morales Bermudez. The result is that only four or five associations continue to function."

The function of the associations was a dual one. Their first role was to find a market outlet for artisan goods manufactured by the members. The second role was to represent local artisans in order to lobby for legislation favorable to petty producers.

In their role as a conduit for artisan products, the associations channeled most of members' output to a government buying agency, Empresa Peruana de Promocion de Artesania (EPA). This agency was responsible for selling these products through a chain of government stores. As is typical of many government organizations, EPA has become top heavy with administrators. In fact, the agency would go bankrupt if it were not subsidized by the government. It is rumored that EPA falsifies the sales reports that it submits to the government. Despite such practices by some employees, EPA is gradually disintegrating. Lack of faith in EPA led the associations to form their own cooperative to market their products. The federation was led by the urban-educated sons of local artisan vendors and producers. One goal of the federation

was to develop foreign markets for artisan production. The government resisted this challenge to EPA and used political pressure to destroy the federation.

The major problem of artisan production in Puno is limited demand:

> "The typical part-time artisan producers who are my caseros are capable of manufacturing ten sweaters a week. The lack of a market limits their production instead to only two or three sweaters. They earn from S/400 to S/500 on each sweater they sell. If they raise sheep, it takes three years until the animal matures for slaughter and is sold for S/1,500. Agricultural production is unfeasible in many areas and even livestock production is risky. This explains why many peasants are dependent on petty artisan production for their survival. What these people need is advice on livestock production techniques.
>
> I have 15 to 20 regular clients who supply me with sweaters. Before any of them travels to Puno, they are given sweaters by their neighbors and relatives to sell. Thus, each of the 20 clients represents four or five other people in addition to their own production."

Alpaca fiber prices reached a high of S/1,200 a pound for white wool during October to December 1979. By May 1980, the same wool could be purchased in rural production areas for S/550 to S/400 a pound. This wool would be resold by middlemen in the Juliaca market for S/600 to S/800 a pound. Such fluctuations in the fiber prices that are paid to the producers illustrate why they

might profit economically if they used their wool to make artisan products rather than selling it.

Final Observations and Recommendations

The massive slaughter of hacienda livestock in the initial stages of the 1968 agrarian reform severely reduced non-peasant stock holdings. To replenish the newly-formed cooperatives, sheep were imported by the Peruvian government. In 1973, 40,000 sheep were imported from New Zealand and Australia. The cost of these animals was S/127,000,000. In a second massive importation of sheep, this time from Argentina, sixty-thousand sheep were imported at a cost of S/273,075,000. The major part of the imported sheep were Corriedale ewes; the remainder were rams.

The attempts to distribute the improved sheep to the peasant communities have been a failure. The improved sheep often died from a lack of adequate feed, the harsh climate, and a lack of supervision. The high cost of importing sheep and their high death rate has caused animal scientists to refocus their attention on the native breeds of sheep. Sumar (1974) supports this renewed emphasis on local breeds. "Experiments with improved and native sheep raised on cultivated pasture (rye-grass and white clover) at La Raya demonstrate that given adequate feed native sheep will produce at rates not overly lower than imported breeds. This was especially true for meat yields. It was also found that native sheep have a higher reproduction rate."

Similar results were also obtained by the New Zealand Agricultural Aid Project (1980):

> "The importation of 40,000 Corriedale ewes into Peru in 1973 has not been successful. In most cases, these

sheep have produced no better than the locally bred ones. Possible genetic differences may exist, but these cannot be expressed while the level of nutrition is such a limiting factor. The provision of good pastures and forage crops must come first before animal production levels can improve. Considerable extension effort has been exerted during the four years (1974-1978) of the project to date to inform producers of this basic requirement for production."

The expense and difficulty of cultivating clover and/or alfafa tends to limit their use to large cooperatives. However, one viable alternative forage crop introduced by the New Zealand project - turnips - appears to have great potential. According to the project report:

"Turnips require no harvesting and do not deteriorate if left ungrazed until well into winter. Their cost of production is thus less than oats and their yield of dry material is comparable in similar situations. Turnips are available for grazing in early mid-winter, from May to August."

In areas of mixed agro-pastoralism, turnips may prove to be a successful innovation. The dry winter period is one of diminishing pastures, animals could be fed turnips as a dietary supplement. In areas where cultivated pasture is feasible, work needs to be done on the development of silage facilities. The importation of portable hand-cranked silage machines which can be transported from field to field proved a viable innovation in the

department of La Paz (Bolivia). There, Peace Corps Volunteers provided administrative and technical guidance to peasant small holders interested in silage. To my knowledge, the only silage machines in Puno are stationary machines powered by tractors and only used in the cooperatives.

The drastic declines in livestock caused the Government to control strictly the slaughter of animals. Some controls have been dropped, but there still exists a two-week ban each month on beef consumption in Lima. Officially, livestock producers are limited in the annual number of animals that they are allowed to slaughter. In the province of Huancane, producers may only slaughter annually 15 percent of their total cattle, 18 percent of their sheep, and only 9 percent of their alpacas. Additionally, only 40 percent of the animals slaughtered can be females, this rule applies to all species. To insure adherence to these laws, producers are required to apply to the local office of the Ministry of Agriculture for slaughter permits. People caught transporting meat without such a permit face fines and confiscation of the meat.

Diffusion of Information

One constant difficulty confronting livestock specialists in the Andes is how to transfer their knowledge to the peasantry. This can best be achieved through demonstration seminars held in the local communities. Aided by native speakers, technical personnel can demonstrate to the assembled villagers the use of handshears, medicines for external parasites, castration and docking techniques, and other basic skills. Peasant women should always be included as participants, as they do the majority of

pastoral chores. Such teach-ins should last several days and include rest and recreation periods. All school-age children should be encouraged to attend. The preparation of simple technical pamphlets is another excellent means of diffusing information. One excellent example of what can be done is the pamphlet: "Enfermedades de los ovinos y su tratamiento" by Bernardo Fulcrand Terrisse.

The Small Ruminant CRSP project should prepare similar pamphlets about llamas and alpacas. Pamphlets could be prepared on topics such as:

1. dipping to control external parasites
2. control of external parasites
3. genetics and stock selection
4. record keeping and/or bookkeeping

No basic pamphlet exists in Peru on llama and alpaca production for distribution to the peasant producers. These pamphlets should be written in simple Spanish, using Quechua and Aymara terms where appropriate. They should be accompanied by drawings to illustrate main points. The figures shown on them should have native terms. The pamphlets should be sold at a nominal fee and not be distributed freely. Free pamphlets tend to be grabbed by people whose only interest is in obtaining a cheap source of paper for starting fires and for other uses. People who spend cash on pamphlets are more likely to be seriously interested in learning from them. The best place for distributing pamphlets is during the teach-ins, they can be used to reinforce the material

which has been discussed. Shorter teach-ins may be held at the weekly markets. Medicines and pamphlets may also be sold in the market during such teach-ins.

The much publicized peasant resistance to change is much more a result of inadequate aid programs than an inherent peasant conservatism. Development programs fail because:

1. They are not attuned to the local ecology.
2. They are too expensive for peasants to undertake.
3. They are not adequately explained.
4. The program personnel disregard local customs.
5. The program personnel fail to follow up initial project implementation.
6. The failure to consult village authorities on the role they should play in the project.
7. The local people are not given enough responsibillity for the outcome of the project.
8. The project was never desired by the local people.
9. The project was seen as benefiting only the local elite.

The best project is a small-scale one that gives immediate tangible results. It is not necessary to plant 20 hectares of alfafa in order to prove that it will grow in an area. It is better to work with small plots in different microniches. Once the people see that it can be done, they will emulate each other. If envy is the peasants' weakness, emulation is their strong point. New experiments should be aimed at medium income peasants who are willing to cooperate. Poor peasants cannot afford to take risks and rich peasants don't need help. Once the innovation has proven

successful, it will be adopted by other sectors of the community. Credit and/or low cost material aid will help the poorer peasants to achieve better production, once they have been motivated to do so through observation of their neighbors' successes. Above all, the people must do the work. They must be held responsible for tending the projects. Some development agents work with schools but this is not always fruitful, once school is in recess, no one may be available to attend to the school project.

One last comment on field techniques. The best helper one can enlist for demonstration seminars is the lowest ranking employee of the local Ministry of Agriculture office. Such employees are often the children of peasants and are highly motivated to help the peasants. They should speak Quechua (or Aymara) and know the local customs. Leave the administrators behind their desks to write reports. One needs people who are not afraid to get their hands dirty. The ability to eat native food, chew coca, and sleep on sheep hides are also pluses!

Llamas - Meat for the Masses

The llama is an ideal source of meat. Llamas are superior to sheep and alpacas in body size and are more domesticated than the alpacas. They will thrive on barren lands where sheep and alpacas cannot feed. The nutritive value of llama meat compares favorably with that of beef and surpasses that of pork and mutton.

Table 13: Comparison of the Nutritive Value of South American Camelids with other Species. (Fernandez 1970:190):

	Percent of:		
Species	Protein	Fat	Ashes
Hogs	14.50	37.00	0.75

Sheep	17.00	28.00	1.00
Chickens	18.50	0.34	0.91
Alpacas	18.93	1.06	1.11
Calves (veal)	19.00	7.50	1.40
Cattle	21.00	5.05	1.00
Llamas	21.72	1.21	1.17
Horses	22.00	2.50	1.00

In recognition of the potential of llamas as a food source, Sumar at La Raya has initiated a research program on llamas. It is his conviction that with the decline of llama caravans, the body size of llamas has decreased. This is due to the producers' neglect to breed for the large animals once favored as beasts of burden. One factor which does need improvement is the quality of llama meat. The taste of alpaca meat is clearly superior to that of the llama. This disadvantage could perhaps be eliminated through the cross-breeding of alpacas and llamas. If done correctly, the result could be a large-sized llama with the tender meat of the alpaca. The popularization of llamas as a desired source of meat should counteract the present decline in their numbers. It would also motivate inhabitants of barren puna lands to retain production of the animal best suited to the local ecology. In sum, producers would increase their income by generating a source of protein affordable to the masses of Peru. Given that this is the goal of the Small Ruminant CRSP Project, the llama should be given special attention by the project.

Land and Animals in Peasant Communities

One result of the agrarian reform has been to force private producers to adopt intensive ranching methods. Prior to the

reform, owners of large estates were content to graze their animals on natural fodder with a minimum of capital improvements. Present-day ranchers, stripped of much of their lands, have been forced to compensate by investing in fencing and in improved flock management techniques. In brief, the present situation of the independent producers in Peru is analogous to that faced by large cattle ranchers in the western United States at the close of the 19th century. These ranchers, confronted with the invasion of homesteaders, began to resort to improved pasture and livestock as a means of compensation for the decreases in their land base.

Peasants in Peru, who have had their lands usurped for centuries, have often exercised better management of the livestock than the hacendados. After all, the peasant with few animals is more apt to give them individual attention than the largeholders, who reside only part time on their ranches. It is the lack of capital, education, and access to technological innovations which have limited peasant production, and not a lack of dedication to the livestock. These difficulties can be resolved, but there is one constraint on peasant production that exists as a major obstacle to development, that is lack of land. Many of the peasant communities in Puno are located on marginal lands and are surrounded by cooperatives. Already, many communities have approached the maximum size of demographic growth of both humans and livestock. The result is that the younger generation, unable to subsist as pastoralists, are leaving the land for urban areas in search of work. Their parents and elders who remain behind are faced with productivity declines caused by overgrazing. Some

areas of Puno have already witnessed peasant invasions on the coopoerative lands which border their communities.

There is one other problematic which exists in peasant communities and which further complicates development efforts. This is the issue of land tenure. Private property in Peru is taxed by the government. Peasant communities, especially pastoral ones, traditionally own land in common. This corporate system of land tenure exempts officially recognized peasant communities from payment of property taxes. However, in actual practice, in many areas community land is actually divided into private holdings. This de facto control over large plots by wealthy peasants has given rise to internal forms of exploitation within peasant communities (Orlove, 1977).

People dependent on animals for their livelihood are not willing to decrease livestock numbers. This lesson has been learned by the New Zealand project. They have recognized two problems facing producers in Puno:

a. A general overstocking of the pastures.

b. An annual winter drought of several months duration with insufficient fodder conservation.

They report that a reduction in stock numbers is socially unacceptable to producers so the only remedy to both problems is to increase the amount and quality of forage grown, with some conserved for winter use.

Attempts to impose community-wide reductions in animals are useless. It might be possible to instruct people on proper rotation systems, but in areas with limited land holdings, even that will be difficult. One immediate problem area to be addressed

is basic management techniques of animal health. Peasants in remote areas desperately need instructions on how to control parasites and other diseases and the medicines to do this. Once the benefits of improved livestock become apparent, producers may be willing to cull out inferior animals, thereby reducing population pressure on grazing lands. This could be accompanied by more complicated instruction on genetics and on record keeping. Basic primers on bookkeeping could be prepared and distributed. Producers often fail to note investment expenditures - including labor time - against the economic gains made from the sale of meat and wool. Once the economic benefits of modern management techniques are realized, peasants are quick to adopt them.

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