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BARRIERS TO RANGE MANAGEMENT RESEARCH IN PERU

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[1] This paper is based upon interviews with 32 Peruvian "forrajeros" and research administrators in Peru during 1981 and 1982. Although these persons provided the information contained in this paper, the authors are solely responsible for its contents.

The social sciences' contribution to range management is not limited to the study of range users. Research in range and pasture management can also benefit from social science analysis. Studies of range and pasture research provide the range technician with information that can be used to evaluate the value of research results. Such studies also help governments identify research priorities and define the kinds of research that are needed to support pastoral development programmes. This paper examines range and pasture research in Peru. It illustrates how social and economic factors influence the type of technical knowledge created by researchers and how this knowledge base influences the way that livestock development programmes are carried out.

RANGELAND AND RANGE RESEARCH IN PERU

Peru has three distinct ecological zones: a dry coastal desert, the Andean highlands or Sierra and the jungle of the Amazon Basin. In all regions, livestock production is an important activity. The national herd contains about 15 million sheep, 4 million camelids (alpaca and llama) and 4 million cattle (Ministero de Alimentacion, 1980). Livestock production is particularly important in the Sierra, home of 41% of the nation's population. Virtually all of Peru's sheep, llama and alpaca are found here; 70% of the nation's cattle are also produced in the region. These animals depend on permanent pastures and fallow lands for most of their food. In fact, about 86% of the land in the mountains is used exclusively as pastures (INIA, 1979:648).

In general the productivity of Sierran livestock is low. Productivity is limited by poor animal nutrition, particularly during the dry season. Better animal nutrition is thus the key to improved livestock production. As most of the nation's pastures consist of natural rangelands, the need for research in this area is critical. Since the 1950's, foreign experts and the Peruvian Association of Forage Specialists and Researchers have given research on natural rangelands the highest priority (Associacion de especialistas e investigatores Forrajeros del Peru, 1973; Hull and Rogler 1960). However, while the importance of research on natural pastures and native rangeland has been emphasized, research has focused primarily on cultivated forages.

Table 1. Peruvian Research on Pastures and Forages by Subject Area

Forage	No of INIPA Projects* 1980-81	No of Research Publications** 1900-74
Alfalfa	28	83
Maize	9	81
Clover	6	2

Ryegrass	5	4
Sorghum	4	143
Elephant & 6 other tropical grasses	4	83
Beets/Turnips	3	2
Natural Pastures***	3	22
Oats (forage)	0	63

* Proyectos y Sub-proyectos de Investigacion Agropecuaria 1980-81 (INA, 1980).

** Bibliographia Peruana de Pastos y Forrajes (Cardozo, et al., 1974).

*** The natural pastures category includes research on the introduction of cultivated legumes (such as clover and alfalfa) into natural pastures.

Table 1 summarizes research conducted from 1900 to 1974 on pastures and forages and also shows the number of on-going research projects sponsored directly by the Ministry of Agriculture in 1981. Over 90% of Peruvian research is on cultivated forages. Alfalfa, maize, clover and ryegrass are all given more attention than native pastures and ranges. Moreover, most of the research examines imported forage species. Maize is the only indigenous cultivated forage studied.

Table 1 shows a large discrepancy between the information researchers produce about pastures and forages and the publicly stated research priorities in this field. Agencies wishing to improve the nutrition of Peru’s livestock must either act without information on natural pastures or promote activities on cultivated forages. For the most part, livestock development programmes have promoted the introduction of cultivated forages. This approach has not been successful except in a few areas where intensive dairy production is practiced.

The poorest Peruvians are Indian farmers and herders who live in independent communities or "Communidades Campesinas". These communities contain more than 60% of the Sierra’s rural population as well as the poorest segment of the agricultural population. Over 90% of the land held by these communities is native rangeland and the communities hold over 40% of the Sierra’s grazing land (Matos Mar and Mejia, 1981). In these communities livestock depend upon natural pastures and crop residues for food. Arable land is used to produce food for peasant families rather than forage for livestock.

Cultivated forages show little potential in the communidades. If livestock production in these areas is to be improved, then more attention must be paid

to natural pastures. No significant amount of research on rangelands has to date been generated. For this situation to change, the factors which impede range research in Peru must be identified and overcome. In 1981 and 1982 an attempt was made to address these issues. Over 30 Peruvian forage researchers and research administrators were interviewed in order to understand the reasons natural pastures and native rangelands have not been the object of serious study in Peru. The results from these interviews are summarized below.

PASTURE RESEARCH IN PERU: A BRIEF HISTORY

Peru's modern history begins in 1572 when Spain eliminated Inca resistance to their rule. Spanish conquest and domination had a profound impact on the culture and social organization of the country. The Spanish introduced new crops such as barley, wheat, and faba beans and European animals such as cattle, sheep and goats. Agriculture was not a significant part of Peru's economy until the 19th century. Agriculture met local consumption needs and the economy was based upon the export of minerals - especially silver.

In the early 1800s, the role of agriculture in Peru's economy changed. In 1821, Peru became independent from Spain and opened itself to foreign investment and more diversified foreign trade. After the discovery of gold in California in 1849, Peruvian ports became important provisioning points for ships en route to California. This created a market for Peruvian agricultural products. Great Britain became its major trading partner. The rapid expansion of textile manufacturing in Britain created a large demand for wool; British entrepreneurs thus encouraged the expansion of commercial wool production throughout the world. The mid-nineteenth century saw a "wool boom" and investors scrambled to develop new sources of wool in the Americas, Australia, New Zealand and south Africa. Peru quickly responded to this new opportunity. By the end of the 19th century, sheep and alpaca fibre were major Peruvian exports. The bulk of the wool trade was handled by British trading companies.

As wool production became profitable, investors sought ways of increasing their production potential. This was generally accomplished by enlarging their landholding, thereby accommodating an increased herd size. Wool producing estates or "haciendas" soon dominated the commercial production of sheep wool and became active participants in marketing of alpaca fibre.

The rapid expansion of estates in the 19th century was accomplished by appropriating the land of Indian communities. As the haciendas developed semi-feudal economic relationships developed between hacienda owners and the local Indian population. Indians provided labour to the hacienda in return for the right to graze or to farm hacienda lands. As the 19th century

progressed, Indian resistance to the expansion of haciendas increased. By the end of the century no land was readily available for estate expansion. As a result, alternative means of expanding production were explored. Progressive estates turned to Europe and Argentina for ways to improve the productivity of their flocks without expanding the herds or territory.

The local "criollo" breed of sheep, though well adapted to Andean conditions, was small and produced low quality wool. Some estates dealt with this problem by either replacing criollo sheep with Argentine merinos or by cross-breeding local sheep with imported purebreds. Imported sheep fared poorly in the Sierra; they often died and the productivity of their offspring was not greatly superior to local breeds (Venturo and Calderon, 1952). Native Peruvian pastures simply were not meeting the nutritional needs of highly productive imported animals. Addressing this issue, A.L Gadea. an Argentinian scientist, researched natural and cultivated pastures near the shores of Lake Titicaca. Gadea published one of Peru's first forage research reports in 1903 (Cardoza et al., 1974:33). Comparing the effects of imported forages with improved management of native pastures, Gadea obtained better yields from pastures which were sown with the imported forages. These results were to have a significant impact on future research efforts.

The first permanent livestock and forage research facility was established with British support at Chuquibambilla in Puno Province. British wool merchants had a vested interest in improving the quality of Peruvian wool, so the British supported the establishment of a demonstration and research farm, "La Granja Modelo de Chuquibambilla" (Stordy, 1921). Pasture and forage research was part of the programme at the "Granja Modelo" and continues to this day. The farm at Chuquibambilla was managed by British expatriates until the 1930's when the Peruvian government took over its operation. Research on cultivated pastures dominated efforts at Chuquibambilla and little attention was given to natural pastures. In 1932 the Peruvian director of the Granja Modelo wrote:

> It has been shown that the natural pastures of today are unresponsive and poor and deficient in minerals and, more importantly, that they can only nourish and produce degenerate animals such as those which exist today. If we wish to improve livestock through the introduction of breeding stock which will increase the quantity and quality of wool and produce more meat, we must quickly begin seeding and cultivating high yielding forages which are rich in nutrients. (Barreda, 1932)

North American involvement in Peruvian pasture research began in 1940 when the American Office of Foreign Agricultural Research (OFAR) began research on the establishment of pastures in the jungle at Tingo Maria. In 1958 the research station at Tingo Maria was staffed by specialists from North Carolina State University (NCSU) with funds from the U.S. Point Four Programme. The University also established offices in Lima. In 1959 the University evaluated Peru's pasture and forage research needs (Hull and Rogler, 1960). NCSU remained heavily involved in agricultural research in Peru from 1958 until

1972.

NCSU’s initial assignment was to provide research support for Peru’s agricultural research and development agency, SIPA (Servicio de Investigaciones y Promocion Agropecuaria). In 1958 SIPA controlled a large number of demonstration farms, "Fomentos", which were suitable for agricultural research. Two SIPA forage researchers were attached to the NCSU programme. Studies on cultivated and native pastures were conducted. They began range research programmes at Chuquibambilla and near Cusco. In addition to these sites, some pasture and forage research was conducted at Cajamarca, in the Northern and Central Sierra. SIPA scientists, with the assistance of NCSU, conducted range and pasture research from 1958 until 1961.

SIPA’s research programme was undermined by the political changes occurring in 1961 and 1962. Until then, Peruvian higher education, which was concentrated in Lima, was not easily accessible to individuals residing in the provinces. Thus, few could hope to obtain a university education. In the early 1960’s several provincial universities were created. Though poorly funded, these universities were given government-owned lands as a means of generating revenue. These lands included the "Fomentos" used by SIPA for research and extension. The "Fomentos" thus became production units and most research was halted.

Also at this time, NCSU was asked to support the development of the National Agrarian University (La Molina) in a suburb of Lima. Many of SIPA’s staff, including its forage researchers, moved to Lima and became part of the University’s staff. From 1961 until 1972, the NCSU staff supported the development of the universities’ research and teaching programmes. Not only did the NCSU programme train many Peruvian scientists and expand the research capacities of La Molina, it also subsidized the development of an organization of pasture forage researchers. The Asociacion de Especialistas e Investigadores Forrajeros del Peru held its first meeting in 1970 and thereafter held annual meetings until its demise in 1975. Its members were active in the creation of the Asociacion Peruana de Produccion Animal, Peru’s animal science organization.

The 1968 coup d’etat and subsequent land reform disorganized agricultural research. Estates were expropriated by the government and the implementation of land reform programmes took precedence over technical research. Relations between agricultural researchers and the government were strained. Government support for research and agricultural education declined dramatically. The real salaries of researchers declined by more than 60%. In response to these events, many agricultural scientists left Peru in the 1970’s. Those who remained were forced to seek additional funding sources to maintain their standards of living and to pursue their research objectives. Conflicts

between the U.S. and Peruvian governments also increased during this period; the result of which was the withdrawal of US foreign assistance, particularly NCSU's support of La Molina's research programmes.

After the initial stages of land reform, the new government began to re-emphasize agricultural research. Staff at the Universidad Nacional Agraria began to work with the cooperative enterprises which had replaced the haciendas. The Peruvian government initiated a programme to expand its agricultural research under a new agency called INIA (Instituto Nacional de Investigacion Agraria). In 1980, INIA became responsible for agricultural extension and changed its name to INIPA (Instituto Nacional de Investigacion y Promocion Agraria).

It is clear from the preceding discussion that social and political changes have had a large impact on pasture and forage research in Peru. What remains to be seen is the degree to which such factors explain the relative lack of research on range management or natural pastures. This will be the subject of the following discussion.

BARRIERS TO RANGE RESEARCH IN PERU

Interviews with Peruvian scientists and administrators revealed three sets of constraints that have led to over-investment in research on cultivated forages and inadequate attention to the management of native rangelands. These constraints to range research can be identified as: (1) socio-political pressures, (2) lack of resources for range research and (3) the influence of foreign assistance programmes.

Socio-Political Pressures

Peru, particularly in the Sierra, is an ethnically stratified society (Van den Berghe and Primov, 1977). Persons who speak Spanish and are part of Peru's "Spanish" or "Criolla" culture occupy all positions of power and influence. Those who speak little Spanish and are members of Indian communities are poor and powerless. In order to improve their social or political position, the Indians must leave their communities and adopt Hispanic culture and language.

In a society like Peru, products and technologies common in Europe and North America are held in high esteem. Conversely, products and technologies uniquely Indian have low esteem. In the research arena, this bias has led to research on exotic plant and animal species over research on native species. Furthermore, the needs and problems of Indian communities were not seriously addressed by the government until the 1960's. Community members produced for their own subsistence, while government research efforts concentrated on the

commercial production of food and fibre.

Commercial producers have been less interested in native pastures. Commercial livestock production has been dominated by haciendas and the large-scale enterprises which succeeded them. The owners and managers of large commercial firms do not place a high priority on range management research. Although their pastures are not optimally managed, commercial producers nevertheless show more interest in cultivated forages which have high nutritive value for imported breeding stock. They are also a potential source of supplemental feeding for gestating ewes and market lambs. Producers who have traditionally supported research see cultivated forages as a way to improve animal nutrition. Their interests have resulted in substantial political and economic support to forage research rather than research in natural pastures.

Natural pastures are the most important resource to small producers and members of Indian communities. Neither of these groups is a traditional client of agricultural research. In fact the Indians have long-standing conflicts with large commercial producers over grazing and property rights. Since researchers have the same background as ranch managers and often work with them, "communeros" (community members) treat the Indians with suspicion. Under these conditions, it is extremely difficult to carry out long-term cooperative research projects in communities. When interviewed, Peruvian researchers typically insisted that "it is impossible to conduct research in communities." Forage researchers who have worked in communities have had difficulty carrying out experiments because of political shifts within the community itself. Communities have occasionally ousted researchers before experiments were completed and have held researchers accountable for the actions of the government or of large commercial ranches. One leading forage researcher was so rudely treated by "communeros" when he tried to work with them that he said that he will never do research in communities again.

Smallholders and community members are less interested in cultivated forages. They have not adopted them in areas where experimental work has demonstrated their value. Land suitable for forage production is also suitable for food production. Food for family subsistence has priority over animal feed for most small producers. In addition, the capital requirements for developing forage crops are high. Government attempts to encourage the production of cultivated forages such as orchard grass, alfalfa, ryegrass and clover have had very limited success.

From 1974 to 1982 New Zealand sponsored an ambitious programme aimed at introducing cultivated pastures to Puno Province, an area where experiments with cultivated forages have been successful for more than 70 years. Planners estimated that there were at least 150,000 hectares suitable for cultivated pastures, but after 8 years of effort only 2,349 acres had been planted in the

whole province (Tamariz, 1982). Most of the acreage planted was on large cooperative ranches.

The failure of New Zealand's programme to reach its objectives has not reduced the interest in research on cultivated forages. If anything, some of the problems faced by the programme have generated new research agendas aimed at resolving some of the management difficulties encountered.

Resource Shortages

In addition to the socio-political factors noted above, lack of research resources has also biased research in Peru toward cultivated pastures. Lack of money and trained personnel have hampered all aspects of agricultural research in Peru, particularly studies of natural pastures. Most pasture research requires a large effort over a long period as well as a relatively large amount of animals and land. Successful pasture management studies also require at least 3 years of effort for cultivated pastures and 10 years for natural pastures. Because of the additional time requirements, range research involves a much larger commitment of resources than does research on cultivated forages.

There is also an acute shortage of government owned land in the Sierra which is suitable for pasture research. It is possible to evaluate the adaptability to Peruvian conditions on imported cultivated forages upon small plots within research farms because extensive literature on these species exist. Studies of natural rangelands in general and studies of pasture management in particular require relatively large amounts of land to be devoted to research for long periods of time. The only large plots of land are located at Chuquibambilla and La Raya in Southern Peru, far from the Universities that carry out pasture research. Apart from some small research farms in the Mantaro Valley, there are no publicly owned pasturelands in the Central Sierra. The National Agrarian University is located in the Coastal Desert and has no convenient place to conduct research. By and large, forage researchers depended on the haciendas and the cooperative enterprises (SAIS) that succeeded them for support. As we noted earlier, these enterprises are not very interested in research on native rangelands.

In 1982 forage researchers conducted work on SAIS Pachacutec, SAIS Tupac Amaru and SAIS Cahuide. Prior to 1968, these SAIS were the progressive haciendas which cooperated with researchers. The haciendas and the SAIS which succeeded them provided land, animals, and some of the labour and materials required for research. This partnership provided researchers with desperately needed land and animals. Cooperation between the ranches and researchers requires that ranch managers have a vested interest in the research itself and they have been more interested in cultivated forages than in natural pastures. The fact that range management experiments require a longer time commitment than

studies of cultivated forages also limits the attractiveness of range research for commercial enterprises. The priorities of commercial ranches tend to limit pasture research to short-term research projects.

Most of the cultivated forages studied in Peru are commonly used in North America, Europe and New Zealand. This permits research on cultivated forages to proceed more quickly than studies of native forages. A tremendous amount of research has already been conducted in foreign countries on the cultivated forages used in Peru. Their characteristics and management are relatively well understood. In addition, seeds are available commercially and from international donors. Adaptability trials and nutritional analyses can be conducted with forages grown on small plots within agricultural experiment stations.

Unlike research on cultivated forages, research on natural pastures proceeds at a slow pace. The characteristics of native grasses are not well understood nor is their management. A large amount of basic research is required before practical techniques can be developed. Seeds are not available commercially. Researchers investigating natural pastures must rely heavily on natural processes rather than the plough and drill to modify pastures. As we shall see below, the amount of time required by range research makes it less attractive to government agencies and to international donors.

Dependence on Foreign Assistance

Pasture and livestock research in Peru has depended upon foreign assistance since before the establishment of the Granja Modelo of Chuquibambilla by the British. Expatriate scientists and foreign agencies have staffed research stations, trained Peruvian scientists, and developed agricultural universities. Foreign donors and lenders have made a significant contribution to Peruvian agriculture; they have also been a major determinant of research priorities. In general, foreign assistance programmes have promoted research on cultivated forages rather than range management.

Foreign assistance can help build agricultural science if it supplements and strengthens local researchers. However, when foreign assistance provides virtually all of the research funds available in a country, it can distort or even undermine serious research. After the 1968 coup d'etat, research support from the Peruvian government declined precipitously. Many Peruvian scientists were able to remain professionally active only by becoming involved in foreign assistance programmes. They acted as consultants and conducted applied research related to project objectives. Foreign financed projects provided funds for research materials and supplemented salaries so scientists could devote full time to research. In addition, foreign programmes provided scientists with opportunities for graduate training and with funds to enable

them to travel to scientific meetings. By 1982 being attached to a foreign assistance programme, or "convenio" was the only means of professional advancement for researchers. All of the researchers interviewed by us in 1981 and 1982 were either actively involved in a "convenio" or were desperately seeking ways to become attached to one.

Heavy dependence on foreign funding seriously reduces the autonomy of researchers. In the case of Peru research has thus tended to focus on the interests of the foreign donors; namely, research on cultivated forage. This research bias can be understood by briefly examining the development of range management research in donor countries.

Range management is a young discipline that has developed in the western parts of the United States and Canada and in Australia. Elsewhere, pasture and forage research emphasizes cultivated species. By and large, Peru's foreign research support comes from countries and institutions with little or no expertise in range management - Great Britain, Switzerland, New Zealand and the Netherlands. Although the United State has considerable expertise in range management, to date most North American technical assistance has been through Eastern and Midwestern universities with no expertise in range management such as North Carolina State University, Cornell University and Iowa State University.

Much foreign assistance is based upon the notion of "technology transfer" - the adaptation of technologies common in donor countries to Third World conditions. Expatriate advisors tend to introduce techniques that have been proved successful elsewhere in order to improve Peru's livestock economy. Thus, foreign assistance is largely confined to areas where foreign expertise is significant. Thus, development and research assistance programmes in the pasture and forage areas have emphasized cultivated forages and plant species common in developed nations because these forages exist in donor countries. Peruvian scientists must develop research programmes that further the goals of foreign funded programmes if they are to receive funding. This means that persons interested in cultivated forages are more likely to be successful than those interested in native pastures and forages.

The structure of foreign assistance programmes also favours research on cultivated forages. Often donor nations require that their citizens manage projects and that, wherever possible, supplies be bought from the donor nation. For example, the American government wishes that its foreign assistance funds be used to purchase American breeding stock, American seeds, and American equipment. Other governments have similar regulations. As a result, each bilateral aid programme has a strong interest in seeing whether its own seed varieties or animal breeds are adapted to conditions elsewhere . They are willing to pay researchers to perform adaptability trials and to

do comparative varietal trials. Most research on cultivated forage species is of this type.

The organization of foreign financed development programmes also favours research on cultivated forage species. Most development programmes have a duration of 2 to 5 years. Projects that are particularly successful may be renewed or extended by the funding agency or continued by the Peruvian government. If a project is to be continued, its staff must provide evidence of success within a relatively short period. Unlike research on cultivated forages, this time period is shorter than the length of time required for a typical study of natural pastures.

Since Peruvian researchers depend upon foreign assistance to maintain their programmes and to supplement their income, research on natural pastures holds little attraction. Even those researchers with PhD's in range science devote most of their efforts to the study of cultivated species. As long as the Peruvian government is unable to develop and finance its own research agenda, it is unlikely that needed research on natural pastures will be conducted. The nature of foreign assistance is such that range management research will never be an attractive activity for foreign investment.

Conclusions

Peruvian pasture and forage research are examples of the problems faced by many sciences in both developed and underdeveloped countries. Science and the technologies produced by research are not divorced from everyday life. Range and pasture research in Peru has been shaped more by social and economic forces than it has been by technical considerations. As a result, Peruvians have considerable knowledge of cultivated forages and know very little about the natural pastures that are the foundation of its livestock industry.

Lack of knowledge about natural pastures severely hampers the development of livestock development projects. There is not enough information on native pastures to permit the design of range livestock programmes. There is however sufficient technical knowledge about cultivated forages to permit the design of large seeding projects even though they have had little success to date. Livestock improvement efforts seem to be caught in a vicious circle; while knowledge of cultivated forages is large and growing, cultivated forages have a limited potential for livestock development. Knowledge of natural pastures is insufficient for development planning and is not growing rapidly even though the potential impact of improved range management is very large. As a result, it is the existing base that is shaping development programmes rather than the needs of producers.

Understanding the forces that limit research in a country such as Peru can

help guide our attempts to improve range livestock production. There is little likelihood that Peruvian livestock production will improve significantly as long as pasture and forage research is a "dependent science". An infusion of expatriate advisors and graduate scholarships will have little impact because this field has little autonomy. Overdependence on the support of commercial ranches and foreign development agencies make it unlikely that Peruvian researchers will ever develop a research programme that meets the nation's information needs. Even though the importance of range research is widely recognized, little can be done until Peru is able to support a basic level of range research without private or foreign assistance. Social science research can demonstrate the need for an independent research effort.

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