

Wool and other animal fibers in South America

Roberto Cardellino, Delta Consultants, Uruguay and Joaquín Mueller***

INTRODUCTION

The South American sub-continent is a vast and variable area that includes 12 independent countries and many different ecological conditions, from tropical areas in the north to temperate climates in the centre and semi-desert conditions in the south. (Map 1).

Map 1 – South America



Table 1 – The importance of animal fibers in South America

Production in kgs	
Wool	143 700 000
Alpaca	4 055 595
Llama	3 342 866
Mohair	825 000
Vicuña	5 580
Guanaco	1 500

Source: Cardellino,R. based on SAGPyA, SUL, ODEPA, IICA, IWTO

Wool is by far the most important animal fiber in South America; however other animal fibers like alpaca, llama, and mohair are also produced in large quantities, whereas vicuña, guanaco, angora and cashmere have a great potential for development but the amount produced at present is low (Table 1).

The production of wool and other specialty of fibers is concentrated in the Southern Cone of the sub-continent (Argentina, Uruguay, Chile and south of Brazil), where climate is temperate or deserted. Further north, with the exception of the Altiplano region, (the highlands of the Andes mountains), the production of these animal fibers is not possible due to the tropical climatic conditions.



* Delta Consultants, Director

** National Institute for Agriculture Technology, INTA

Map 2 – South America: sheep producing areas



THE PRODUCTION OF WOOL

The main areas in South America producing wool are shown in Map 2.

Three main sheep producing areas can be distinguished. The largest one, indicated as wool producing sheep area, includes the majority of Argentina, southern Chile, Uruguay and southern Brazil. In that area, wool or dual purpose sheep breeds (derived from the merino) are the more important ones.

The second area, the criollo sheep region, includes the northern part of Argentina, and the Altiplano regions of Bolivia and Perú.

There is a third area, specifically in the northeast of Brazil (a very dry region), where woolless hair sheep are kept for meat and leather production.

The present population of sheep and the estimated wool production in South America are presented in Table 2.

Table 2 – Sheep population and wool production in South America

Country	No sheep (mill)	Wool production (m kg, greasy)	Type of wool	Prod System
Argentina	16,0	65,0	Fine - Medium	Commercial/smallholders
Uruguay	10,4	41,0	Medium - Fine	Commercial
Chile	3,9	11,2	Medium	Commercial
Brazil	3,5	10,5	Medium	Commercial
Perú	14,7	12,0	Coarse - Medium	Smallholders
Bolivia	9,0	4,0	Coarse	Smallholders
Total	57,5	143,7		

Source: Cardellino, R. based on SAGPyA, SUL, ODEPA, IICA, IWTO

The countries more specialized in the production of wool (Argentina, Uruguay, Chile and Brazil) have close to 60% of total sheep numbers, but account for 85% of the wool produced, which corresponds to fine and medium good quality wools.

Two well defined socio-economic regions involved in the production of wool can be distinguished in South America:

1. Small holder production systems. These correspond to low input, low productivity small farms with subsistence economies. The predominant breed is the criollo (derived from the original sheep introduced by the Spanish settlers) or non-defined criollo crosses. Normally these peasants (native population) would also have as part of their way of life, a few camelids and goats.

Main areas where these types of production systems can be found include (see Map 3):

Bolivia, in the Altiplano region at 3000-4500 masl , involving mostly native communities.

Perú, in the Sierra Region (Altiplano), with 43% of very small producers and 32% of peasant communities.

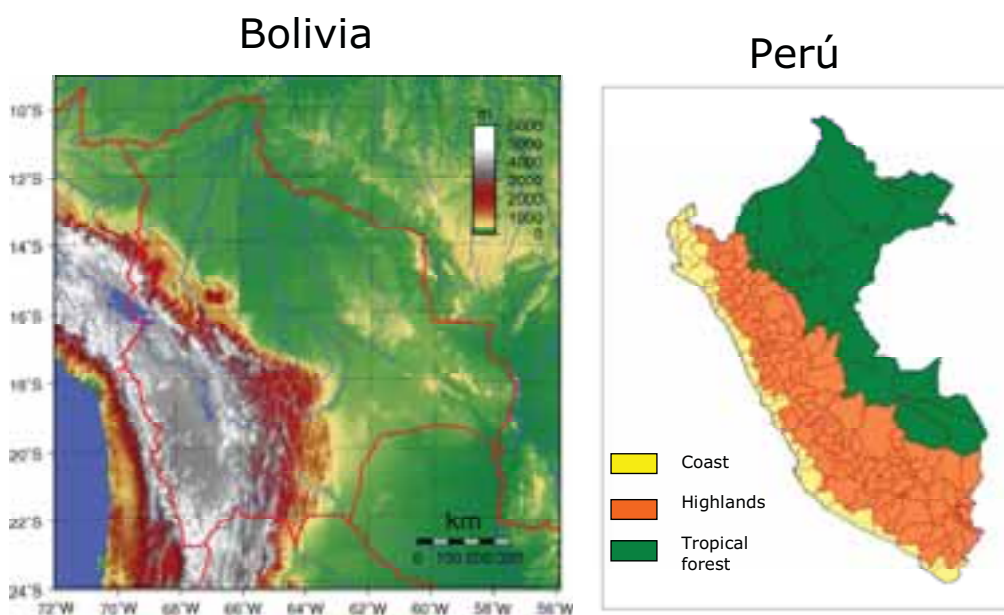
Argentina, in the northwest region (12% of the total) with subsistence livestock systems.

2. Commercial production systems. These include farmers whose main objective is not the subsistence, with a variety of sizes depending on the region, but oriented mainly to the production of wool as a business.

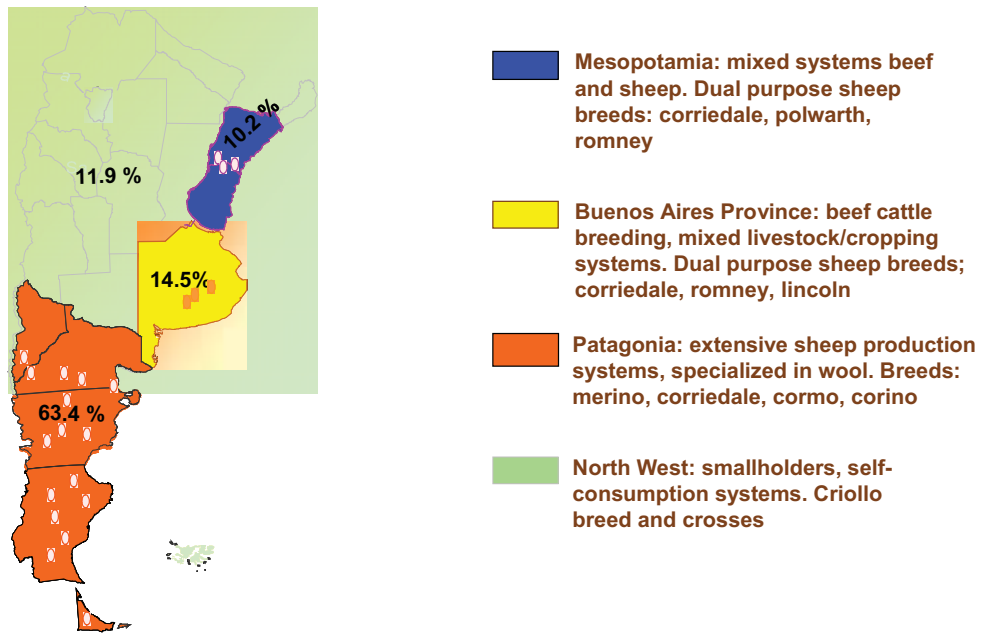
Main areas of these production systems include:

Argentina, in the regions of Patagonia (very dry and cold), mesopotamia (in conjunction with beef cattle) and Province of Buenos Aires (in conjunction with agriculture). It includes

Map 3 – Geographic regions



Map 4 – Argentina – Distribution of sheep by zones and productive systems



Source: SAGPyA, Departamento Ovinos y Lana, 2002

an approximate number of 50.000 growers. Wool exports accounted for 230 mill US\$ last season.

Uruguay, with 38.000 growers in mixed farms with beef cattle, running dual-purpose sheep. Wool exports reached 240 mill U\$ in 2007/08 season.

Sheep breeds in Uruguay: predominance of “Dual Purpose” breeds



Corriedale 60%
26 – 32 μ



Merino 20%
18 – 23 μ



Polwarth 10%
22 – 25 μ



Others: 10%
22,5 – 30 μ

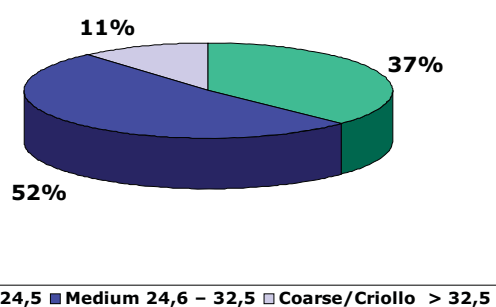


Table 3 - Wool production by fineness in South America. (mkg greasy)

Country	Fine <24,5	Medium 24,6 - 32,5	Coarse/Criollo >32,5	Total
Argentina	40,3	22,7	2,0	65,0
Uruguay	12,0	27,0	2,0	41,0
Chile	0,2	10,8	0,2	11,2
Brazil	1,0	8,5	1	10,5
Perú		5,0	7	12,0
Bolivia			4	4,0
Total	53,5	74,0	16,2	143,7

Sources: Cardellino, R. based on FLA, SUL, ODEPA, IICA, IWTO

Figure 1 - Wool Production by Fineness in South America. (mkg greasy)



Sources: Cardellino, R. based on FLA, SUL, ODEPA, IICA, IWTO

Brazil, with 40.000 growers running mixed farms located in the southern region, with predominance of dual-purpose sheep and wool exports of 25 mill U\$S

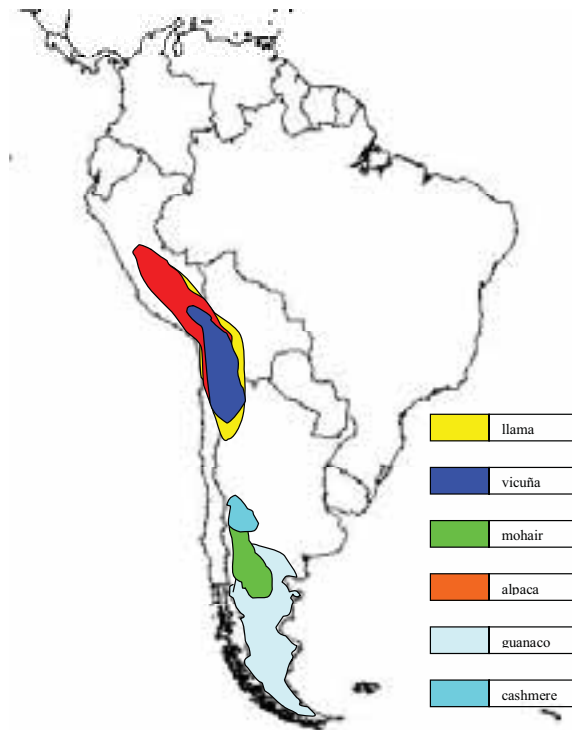
Chile, with 60.000 growers in total. The patagonian region concentrates 60% of the total sheep population, involves medium to large farmers and dual purpose sheep breeds. Wool exports represent 15 mill U\$S

The types of wools produced in S. America, by fineness, are shown in Table 3.

THE PRODUCTION OF OTHER ANIMAL FIBERS

In South America these fibers are produced almost exclusively by smallholders in low input systems where they are critical for the subsistence of its producers by contributing raw material for homemade clothing, handcrafts for local markets or fiber for the textile industry. Most fiber production systems are located in marginal areas with goats and camelids grazing natural rangelands. Alpacas, llamas and vicuñas are typically found in high altitudes of the central Andes while goats producing mohair or cashmere and guanacos are largely found in the Patagonian desert (Map 5). The characteristics and relevance of the production of each of these “special” animal fibers in the subcontinent are described here.

Map 5: Approximate main distribution area of South American camelids and fiber producing goats



Alpaca

The Alpaca (*Vicugna pacos*) is a domesticated South American camelid species whose wild ancestor is the vicuña. Alpacas are raised in the highlands of Peru, Bolivia and Chile. More than 80% of the world's alpaca population can be found in southern Peru, northwest of the Titicaca lake at 3,700-5,000 mt of altitude. The alpaca is a symbol of Peruvian national identity. It is calculated that more than 120,000 families live directly from the alpaca as their main income and subsistence, and indirectly 3 times more than this figure. 85% of the alpacas are run by smallholders with less than 50 animals each, or are kept in farmer communities. Alpacas are particularly prized for their fiber, which is noted for its fineness, softness, light weight, exceptional warmth, hygroscopic features, resistance, elasticity, prestige and

natural colors. Its fabric is soft to handle and shiny in sight. The soft touch is related to the fineness of the fiber but also to the arrangement of the scales along the fiber. "Baby" alpaca fiber diameter averages 22 mic and alpaca "fleece" averages 26 mic. Both types of fiber make up 50% of the total clip; the rest is considered inferior with coarser fiber diameter. The traditional use of alpaca has been in the apparel clothing industry for men. Twenty three alpaca colors are recognized but most (in Peru 86%) of the alpacas are white, the rest ranging from cream to black. An adult alpaca produces 1.5-2.8 kg of fiber per year, enough to make four sweaters. Two alpaca breeds are recognized, huacaya and suri. The former breed produces a spongy type of fleece with fibers growing perpendicular to the skin. The latter have a fleece with long rolling staples hanging parallel to the skin with more lustrous and silkier fibers. In general suris are more demanded and can be found at lower altitudes than huacayas, therefore sharing grazing land with sheep and cattle. About 90% of alpacas are of the huacaya breed. Alpaca is the main special fiber produced in South America.



Llama

The llama (*Lama glama*) is the other domesticated South American camelid species, its wild ancestor being the guanaco. Both, llamas and guanacos are larger animals than alpacas and vicuñas, therefore more meaty. Most llamas in South America are found in Bolivia and Peru. Bolivia has the largest llama population, about 2.4 million, largely on the high-plateau (Altiplano) at 4000 mt of altitude in the western of the country.



Peru with 1.2 million llamas is the second producer, while Argentina ranks third. It is estimated that in Bolivia there are 54,000 producers, 80% having less than 90 llamas each (José Campero Marañón 2007, personal communication). Llamas are multipurpose animals; they are raised for their meat, power and fiber. As with alpacas, there is a strong cultural tie between llamas and their producers and communities. In many cases llama products are crucial for the subsistence of

a community. (Rodríguez and Quispe, 2007). The fiber produced by llamas is not as fine as that of the alpacas. In Bolivia adult llamas produce fiber with an average diameter of 33 mic, but the fiber is greasy free and may yield up to 93% of its original weight when processed. Llama fiber is extensively used for clothing and handcrafts. Due to its multiple breeding objectives, llamas were selected for high body weight and fleece weight (1.5-3.5 kg) but less for fiber traits such as fineness and uniformity of color. Therefore the pressure to select for white color has been less and llama coat color range from white to black, with shades of beige, brown, red, and roan. Its fleece may be spotted, solid, or marked in various patterns. Two llama breeds are recognized the Q'ara with slim and long bodies and short coat with visible guard hairs, and the T'ampuhlli (in Peru called Ch'aku) which are compact and short bodied with fewer guard hairs and finer fibers. In Bolivia both breeds are equally represented while in Peru the Q'ara breed is dominant (70%).

Vicuña

The vicuña (*Vicugna vicugna*) is the smaller of the two wild South American camelids and its undercoat fibers are extremely valuable and "special", not only for its textile characteristics but also for its rareness and association to exotic environments and culture. After a period of near extinction, the vicuña population recovered substantially in population size in all Andean countries. In Peru the vicuña population is now 140,000 and increasing, as well as in Argentina



with a population of 133,000. Vicuñas are captured, shorn and released using different methods. Although a few vicuñas are kept in captivity systems, in general they are captured during large scale community based events called "Chakus". The procedure is regulated, monitored and documented so that only legal fiber can be marketed and therefore protecting the species from hunting for fiber. This has been particularly important for the fate of vicuñas which recovered from near extinction. At present Peru is producing most vicuña fiber, about 5,500 kg/year, much less is produced in Chile, Bolivia and Argentina (Francisco Rigalt 2008, personal communication). Fiber diameter range 10-15 mic, yarn and fabrics made of vicuña fiber have the highest market price of all special fibers but its production is not easy due to its short staple length and the necessity of separating manually guard and dead fibers from the fine down fibers.

Guanaco

The guanaco (*Lama guanicoe*) is the larger of the two wild South American camelid species and its population is much larger than that of the vicuña. More than 90% of the world guanaco population is in Argentina and the remainder in Chile and Peru. The population of 550,000 guanacos in Argentina are largely concentrated in the southern part of the country (the patagonian desert). Guanacos roam freely in this sparsely inhabited country where sheep production is the main agricultural activity. Capture of guanacos is difficult as they can



easily jump regular fences to escape at very high speed when mustered. Special techniques have been developed in order to capture, calm, shear and release guanacos avoiding unnecessary fear and injury. As with vicunas, strict regulations and monitoring procedures are applied during capture and shearing. Fleece weight is approximately 1 kg in two years growth (Sacchero *et al.*, 2006). Guanaco fiber is not as fine as that of the vicuna but otherwise quite similar, including in its color variations of brown and the presence of dead and guard hair together with the valuable down hair.

Fiber diameter is 16-22 mic for adult animals, removing guard hairs reduces average fiber diameter by 1-2 mic.

Mohair

The third animal fiber of importance in South America is mohair. About 650,000 Angora goats are run in the northwest of Argentina's Patagonia where they produce 500,000 kg mohair of competitive quality. Argentina is among the top world producers of mohair. About 4,500 families make their living on mohair and meat produced by Angora goats. A large proportion of the mohair clip is exported. Only a minor part is processed locally and mohair handcrafts are not common. Mohair is a fiber well known for its luster, resistance, length and smoothness. Notable of Angora goats in this part of the world is the uniformity in color. Almost all Angora goats in Argentina are white, as opposed to central Asian Angora goats where other colors are very common. Angoras are shorn twice a year and produce a total of about 1.5-2.5 kg mohair. Mohair from young animals, (first and second shearing) is much finer (24 mic) than mohair from adult animals (29 mic and more).



Cashmere

In the early 1990's it was realized that the undercoat of many of Argentina's native goats was in fact cashmere. It is estimated that some 700,000 goats in traditional farming systems grow cashmere and potential production is therefore high (estimated to reach 5,000 kg in a few years). Recently a small number of these goat holders started a program of systematic combing their goats in order to extract the undercoat fibers. Results are very promising and the product is being sold to the local and foreign industry. The cashmere collected presents colors which vary from white to black with grey and brown tones being common.

Fiber diameter is as low as 14 mic but averages 19 mic with 25% of animals producing 120 gr combed fiber averaging 17.5 mic (Maria Rosa Lanari 2008, personal communication).



A summary of the production of special animal fiber production in South America can be observed in the next table (Table 4).

Table 4 - Special animal fiber production in South America

Fiber	Animal	Type	Main producer	Farmers	Number of animals	Production (kg)
Alpaca	Alpacas	Domestic	Peru	159 928	3 503 774	4 055 595
Llama	Llamas	Domestic	Bolivia	74 302	4 080 596	3 342 866
Mohair	Angora goats	Domestic	Argentina	4 500	550 000	825 000
Vicuña	Vicuñas	Wild	Peru	100 ^a	319 547	5 580
Guanaco	Guanacos	Wild	Argentina	15 ^a	577 697	1 500
Cashmere	Native goats	Domestic	Argentina	70	700,000	200

^a Management units Source: Mueller, J. based on several sources

FINAL CONSIDERATIONS

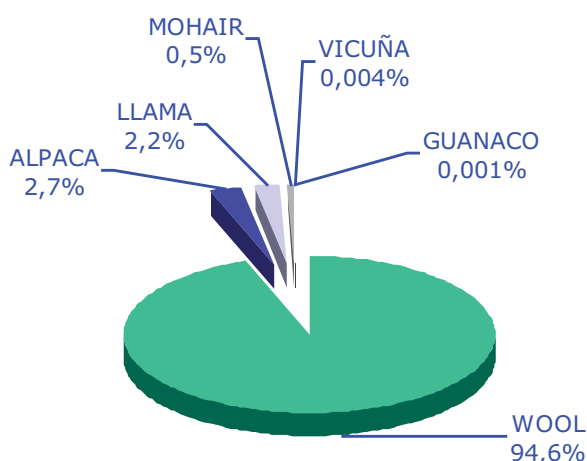
The volume of production of different animal natural fibers in South America reaches more than 150 mill kg, with wool production representing 143.7 mill kg. (see Figure 2)

In addition, the production of natural fibers in South America is very important and with great socio-economic implications. There are more than 600.000 farmers/peasants involved, of which the majority are small holders and subsistence units. However, the number of commercial farmers, particularly those involved in the production of wool in the southern cone is also very important.

The exports of natural animals fibers from South America to other manufacturing countries (mainly China, Germany and Italy) represent more than 600 mill U\$S per year, but there is a very strong early processing capacity (14 combing plants) which constitutes the second producing region after China.

The production, harvesting, transport and early processing of natural fibers in South America also involves a very important source of labor for the people in the region.

Figure 2 - The Importance of Animal Fibres in South America



REFERENCES

- Cardellino, R.C.** 2008 The wool industry in Uruguay. Report to the IWTO Market Intelligence Committee
- IWTO.**- Market Information Report. Edition 2008
- Mueller, J.** 2008. III Seminario sobre Mejoramiento Genético en Ovinos, Salto, Uruguay. La situación en Argentina.
- Rodríguez, C.T. and Quispe J. L.** 2007. Domesticated camelids, the main animal genetic resource of pastoral systems in the region of Turco, Bolivia. In: KA Tempelman and RA Cardellino (Eds.) "People and Animals", FAO, Rome.
- Sacchero, D; Maurino, M. J; von Thüngen, J y Lanari, M. R.** 2006. Diferencias de calidad y proporción de down en muestras individuales de vellones de guanacos de diferentes regiones de Argentina (Lama guanicoe). En: Olivera, D.; Miragaya, M; Puig S. eds. Resúmenes y trabajos "Fortalecer el futuro de los camélidos, una oportunidad para crecer". 4to. Congreso Mundial de Camélidos, Santa María Catamarca, 11 al 15 octubre, p.52.