THE DOHNE IN SOUTH AMERICA

R.C. Cardellino

Delta Consultants, Montevideo, Uruguay

SUMMARY

Sheep production (meat and wool) as well as other fibres, (in particular those produced by South American camelids) in South America is very important. The two main production systems, named commercial and smallholding are briefly described, including their geographic locations. Wool is by far the main animal fibre produced in South America with a volume of 102 million kg (greasy) followed by the alpaca fiber with 4 million kg. The Dohne breed was introduced for the first time during 2002 in Uruguay, being followed by Chile, the Falkland Island, Argentina and Perú, with very good productive and economic results. It is forecasted that the use of the Dohne breed will continue being a very important tool to increase market opportunities for sheep meat and wool in these countries.

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 and cold conditions in the south. It covers a range of environments in which sheep, goats and South American domestic camelids (llama and alpaca) produce meat, fiber, milk and skins for a large number of farmers, contributing substantially to their livelihoods and to the national economies. Given the variety of ecological and socio-economical conditions it is difficult to generalize on production areas, production systems and breeding practices. Sheep are most common in the vast temperate rangelands and deserts of the south, while camelids are largely found along the Central Andean region. Sheep are for the most part dual purpose (wool-meat) whereas camelids are multipurpose. Wool is by far the most important animal fibre in South America, but other fibers, usually called “special fibers” like alpaca, llama, and mohair are also produced in large quantities (Cardellino and Mueller 2008).

Sheep producing areas. The main sheep production areas in South America are shown (Figure 1). Three main sheep 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 prevail, mainly Merinos and derived breeds (Corriedale and Polwarth). The second area, the Criollo sheep region, includes the northern part of Argentina, and the Andean Altiplano regions of Bolivia and Perú. There is a third area, specifically a dry region in northeastern Brazil, where woolless hair sheep are raised basically for meat and skins.

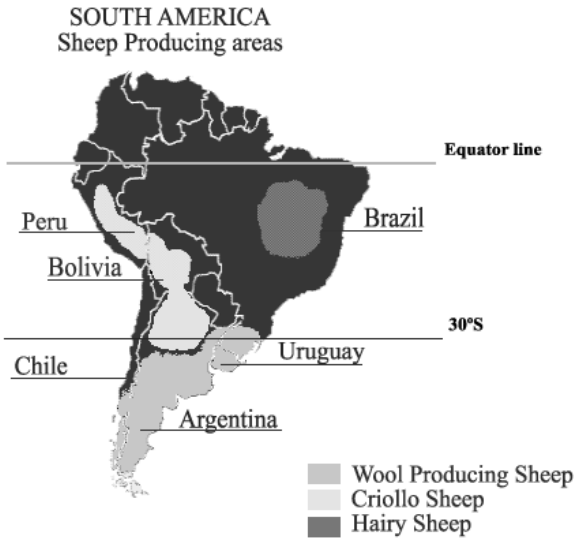

Figure 1 Sheep producing areas of South America.

Sheep production systems. Two major sheep production systems can be distinguished: commercial and smallholder. Commercial systems include farmers with a variety of flock sizes depending on the region, but oriented mainly to the production of wool and meat for the market. Main areas of these production systems included in Argentina are the regions of Patagonia (dry and cold, Merino and Corriedale), Mesopotamia (mixed cattle-sheep farming, Corriedale and Polwarth) and the Pampas (mixed cropping-sheep farming, Corriedale and Romney Marsh). Uruguay, has 20,000 growers in mixed farming operations partnering beef cattle, running mainly dual-purpose sheep. In Brazil, growers run also mixed farms and are located mainly in the southern region, with predominance of dual-purpose sheep. The Patagonian region in Chile concentrates 60% of the total sheep population in the country, and involves medium to large farmers and dual-purpose sheep breeds (mainly Corriedale).

The second sheep production system is the smallholder system, which corresponds to low input, low productivity small farms with subsistence economies. Flock size is small, (20-40 head) and usually mixed with goats or camelids. Sheep are of the Criollo type (derived from the original sheep introduced by the Spanish settlers) or non-defined Criollo crosses. Main areas where these types of production systems can be found include: the Altiplano of Bolivia, a region at 3000-4500 masl (metres above sea level), involving mostly native communities; the Sierra Central Region of Peru and the area north of the Titicaca Lake, with 43% of very small producers and 32% of peasant communities. The Altiplano sheep production systems extend also to the northwest of Argentina (Tempelman and Cardellino 2007).

Table 1 shows that commercial production systems comprise some 60% of total sheep numbers and account for 85% of the wool produced. It also can be seen that most wool marketed is medium and fine wool.

Table 1. Sheep population and wool production in South American countries (2015)

Country	N° sheep (mill)	Prod. System	Fine < 24.5 mic	Medium 24.6 – 32.5 mic	Coarse/Criollo > 32.5 mic	Wool Production (mkg, greasy)
Argentina	12.2	commercial/ smallholders	29.4	15.6	1.0	46.0
Uruguay	7.0	commercial	7.5	17.5	2.0	27.0
Chile	3.0	commercial	0.2	7.6	0.2	8.0
Brazil*	3.5	commercial	1.0	8.6	1.0	10.6
Perú	9.5	smallholders	0	4.0	6.4	10.4
Total	35.2		38.1	53.3	10.6	102.0

Source: Cardellino, RC. based on different sources FLA, SUL, ODEPA, IICA, IWTO.
(*) includes only wool breed sheep

The introduction and development of the Dohne in South America. Uruguay. The predominant breeds in Uruguay are Corriedale, Merino and Polwarth, which represent 60, 20 and 10 per cent of the national sheep flock, respectively. These breeds can be defined as multi- purpose in the sense that they generate income from the sale of wool and sheep meat (surplus offspring and cast for age animals), forcing breeders to consider several traits in their selection programmes. Historically, the production of sheep meat has been a by-product of wool production, with practically no areas specialized in the production of fat lambs. However, in the last 10-15 years, as a result of low and fluctuating wool prices, better prices for lambs, meat production increased its importance in the sheep production systems, representing a higher proportion of total sheep income. So there was the need, on one hand, to reduce the diameter of Corriedale wools, that ranged between 28 and 31.5 microns, and on the other hand to increase the production of lamb meat, improving their quantity and quality.

Uruguay is the first exporter of sheep meat in the region with 25,000 ton, followed by Argentina (6,100) and Chile (5,100). However, the importance of fat lamb production and consequently prices for lamb meat are much lower than Australia and New Zealand, probably due to a less exporting capacity and also very reduced home market consumption (6,2 kg/head in Uruguay, 2,5 in Argentina and 0.3 in Chile). Uruguay, being the third world sheep meat exporter needs to export boneless sheep meat, due to its sanitary condition of “free of Foot and Mouth disease, with vaccination”

This new scenario has also led to the introduction of new breeds, some of them for terminal crossbreeding (Poll Dorset, Suffolk), and others like the Dohne Merino, to be used on Corriedale flocks to rapidly reduce the diameter of the wool, not loosing or improving the production of lamb meat. This general trend to improve meat production has also been followed by a generalized emphasis in producing finer wools, both in Merino and Corriedale flocks.

After a couple of visits to South Africa where we had the opportunity of knowing the Dohne Merino, several attempts were made (three in total) to import Dohne genetics from that country, which were unsuccessful, due to sanitary restrictions. Finally when the Dohne was imported into Australia, Tres Arboles stud imported in 2002 the first 3 rams, and 350 embryos from Summerfield stud in WA, which were followed the next year by a new importation of 4 rams, 6 ewe hoggets (to super-ovulate) and 400 embryos. An extensive program of grading up 2000 merino breeding ewes started immediately, following the standards of Australian Dohne Breeders Association in Australia. After attending a Dohne workshop at the Far Valley Dohne stud, conducted by Cameron McMaster and Allan Casey, Tres Arboles became a member of ADBA and since then, joined the genetic evaluation of Australia in order to have international breeding values (Sheep Genetics).

Gradually, several other Dohne studs were established: La Pastoral, El Piramidal, Nambi Guasu, many of which were also involved in the importation of embryos and semen from Australia. These sources included: Macquarie, Roseville Park, Uardry, Mt. Alma, Kardinia, and others. All these attempts to introduce and develop the Dohne as a well established breed, capable of producing very positive results for the Uruguayan sheep industry, were absolutely private and had no financial support of any governmental organization. The involvement of INIA (the National Research Institution) and also of SUL (the Uruguayan Wool Secretariat) in performing experimental and impartial evidence of the benefits of the Dohne in crosses with other breeds, in particular the Corriedale, was of outmost importance. Despite a small reduction in fleece wt (10%) and a small reduction in staple length, there was a reduction of the diameter in 4 microns in one generation, whiter wool (reduction of 25% in y-z values), faster growing rates (10%) and better meat quality (bigger eye muscle area with less fat).

Initial clientele were mostly Corriedale breeders, but in the last years, it has been observed a very marked increase in the number of Merino breeders wanting to improve meat characteristics, without affecting their production of wool. The last three years, average prices of Dohne rams in open sales were the highest of all the breeds. At present, there is a Uruguayan Association of Dohne Breeders (SCMD), which started to function in 2013, that includes 25 members with 15 ram breeding flocks. These numbers will probably be expanded in the near future. Estimates of the presence of Dohne genetics in the Uruguayan flock indicate, that it represents between 7 and 10%. Initially in 2013, the Association decided not to compete with animals in ram shows following what were the rules in South Africa and Australia. However in 2016, this decision was changed and now breeders can compete with animals at shows. It will be discussed how to combine objective and subjective evaluations.

Chile. Chile is a long and narrow country of the western side of the Andes mountain chain, and extends from latitude 18°S in the north to 55°S in Punta Arenas and the island of Tierra del Fuego (McMaster, 2015). Total sheep numbers is estimated in 3.0 million, and are mainly concentrated in the Provinces of Magallanes and Aysén (65%), in the southern part of the country, in the Patagonian ecological region, with 220-550 mm of rain. In this region, sheep are run extensively on units of more than 4000 animals/farm, with an average of 0.8 DSE/ha. Winters are very cold with frequent snow, so shearing and lambing usually take place in late spring-early summer. Corriedale is the main breed, producing wools between 28 and 30 microns, of very good colour. The Patagonian region produces 72% of total sheep meat in Chile, with 4 abattoirs installed in Punta Arenas and Tierra de Fuego, which are open between December and the end of May, due to a very highly concentrated offer of light lambs.

As in the other countries in South America, breeders considered that they had to investigate the possibilities of changing their dual purpose production to produce finer wools and more volume of meat with better quality. Estancia Josefina was the first breeder to import Dohne embryos and semen from Australia in 2003, to grade up Corriedale flocks. Further embryo imports by other breeders soon took place. After some trials to compare the Dohne and also the MPM (multi-purpose Merino) on Corriedale ewes in Tierra del Fuego, it was decided in many farms to substitute the Corriedale by Dohne to reduce the fibre diameter in these flocks (in order to increase the value of the wool clips), but at the same time maintain or improve the production of meat. Another Dohne breeding program started further north in the area of Aysén (also in the Patagonian region), operated by INIA (the National Research Institute) that also involved the importation of semen and embryos from Australia. Results so far are very encouraging in general, with a decrease of 5 to 8 microns and close to 10% less wool than Corriedales, which means an overall increase of 40 to 50% in the gross income from wool.

At present, there are 9 Dohne studs with pure Dohne animals in the region of Magallanes, 4 in the continent and 5 in the island of Tierra del Fuego. These breeders are in the process of

forming a Dohne Breeders Association and so far, there are no competitions in the shows; they are just taking animals to be known by other breeders. It is estimated (Vera, H., personal communication) that between 15 and 20% of the Magellan sheep flocks have Dohne blood. The prospects for the breed in Chile are very good, given the results obtained so far and the growing demand for Dohne rams.

Argentina. Sheep may be found everywhere in Argentina though with large differences in density, prevailing breeds and production systems. By far the most important one is Patagonia with two thirds of the 12.2 total million sheep of Argentina.

Argentinean Patagonia is a vast barren space covering the area south of parallel 40°; thus a temperate to cold region with average winter temperatures around 0°C and average summer temperatures around 14°C. Pacific ocean prevailing westerly-winds blow dry, cold and strong winds across Patagonia to the Atlantic Ocean. This makes the region desert-like with rainfalls ranging 100 to 300 mm mainly in winter. Heavy snows falls are common in winter, frosts can occur throughout the year. Climate in the Island of Tierra del Fuego and Magellan Strait region has more Atlantic influence and is cold but more humid and stable whereas the central region of Patagonia has more extreme weather conditions (centre of Chubut and Santa Cruz Provinces). Patagonia has become a strong tourist attraction due to its marine wildlife, fly-fishing areas, winter sports and Andean scenery. This phenomenon increased land values and promoted agro-tourism business for many traditional sheep farms. In addition, oil exploitation and oil services also generate extra revenues to many farms but with these exceptions sheep production is the only income for most farmers in Patagonia.

Sheep are run on rangelands where stocking rates vary from 2 hectares per sheep in the best areas located in the more humid parts of the South and West to 8 hectares per sheep in the dry central Patagonia. In the poorer ranges of the central North Patagonia, Merino is the main breed whereas in the southern more humid areas most sheep are dual-purpose Corriedale and Merino-Corriedale crosses. Reproduction is seasonal with mating in May (autumn) and lambing in October, somewhat earlier in the more temperate northwest of the region. After lambing many farmers move their stock to summer grazing areas at higher altitude at the foothills of the Andes. In Patagonia there are about 8,500 sheep farms; of which, 80% have less than 1,000 head of sheep (18% of the total sheep population), whereas 20% have more than 1,000 head of sheep and 82% of total sheep population. Thus, sheep are found either in many small family holdings or in larger company farms. In general, meat contributes at least 60% of farmer's income.

Several breeders and scientists visited Uruguay to know the Dohne breed, its main characteristics, and check its performance in crosses with Corriedales and Merinos and were very enthusiastic about introducing the breed in Argentina, which they did in 2005. The first importations from Australia and Uruguay (semen and embryos) were initiated by INTA, the National Institute for Agriculture Technology, and taken to the Experimental Farm in Río Mayo (Chubut Province) and also to a private farm (Rincón de los Morros), located further south in the Province of Santa Cruz, both in Patagonia. Since the beginning, INTA has been in charge of the assessment of the productivity of Dohnes in different Patagonian environments as a pure breed and for crossbreeding on Corriedales and Merinos (McMaster C, 2015). At present in Rio Mayo there are 160 pure pedigree ewes being mated, as well as 350 F1 and F2 ewes Dohne x Merino. Under the present program, all registered animals have full pedigree and performance information. The genetic evaluation is carried out by INTA and the visual assessment of animals is performed by technical personnel of the AACM (the Argentinean Association of Merino Breeders). Those F3 animals with Breeding Values above the average and having been accepted after the visual assessment are incorporated to the pure Dohne nucleus, which operates as an open one. It is significant to note that Argentina is the only country in the region where the Dohne operates under the umbrella of the Argentinean Merino Association (AACM), with which there is full

cooperation. So far, there is no competition of animals at shows. The Dohne is recognized as a variety of the Merino, and there is not an autonomous Dohne Breeders Association operating. Another 5 private Dohne studs operates under this system, mainly located in Patagonia. However there is a significant number of farmers that have been using Dohne to cross Merino or Corriedale flocks in the Patagonian region but also in other Provinces further north.

The productive conditions in the Patagonian region are much tougher and difficult than other regions where temperate or sub-tropical climates predominate. In spite of this, the measured performance of the Dohne and Dohne crosses show in general terms similar results than those found in Uruguay, that is higher weaning and carcass weights (>10%), better meat quality traits (bigger eye muscle area and less fat), some reduction in fleece weights, and big reductions in the diameter with better colour (in Corriedale crosses). Results obtained by INTA also show a better maternal ability of the Dohne compared to local Merinos.

It is very likely that the Dohne, having confirmed a higher overall productivity as a dual purpose breed, will probably increase its role as a dual purpose breed, grading up Corriedale and Merino flocks.

Peru. The sheep population in Peru is estimated in 9.5 million head, and has been decreasing significantly in the last decade. 85% of it belongs to the Criollo breed and their non-planned crosses. The Criollo sheep, naturalized to the highlands of the Andes since their introduction by the Spaniards 500 years ago, have very poor productive characteristics: coarse wool, very low body weights and carcass weights of 12 to 15 kg at adult age. The remaining 15% correspond to Corriedale and Junín (a local breed derived from the Corriedale), and are in the hands of communal cooperatives and private farmers. More than 90% of the sheep population is situated in the highlands of the Andes (at more than 3.000 masl), grazing on native pastures and run by peasant communities. *"Sheep production in Perú has been based in an obsolete orientation: medium to coarse wool and meat produced mainly by adult and cast for age animals The good results obtained in Uruguay and Chile in crosses with Corriedales, and also the contacts with Macquarie Dohne in Australia convinced Dr.W.Vivanco that the best alternative for increasing the returns of the sheep farmers in the Peruvian High Andes rangelands was the massive utilization of the Dohne (Vivanco, 2014)"*.

Macquarie Artificial Breeders donated to INIA Perú (Peruvian National Institute of Agriculture) in 2005, 130 doses of semen to inseminate and upgrade Criollo sheep, at two different locations, one in the central highlands at 3.200 masl (Huancayo) and the other in the southern highlands at 3.900 masl (Puno). These first importations were followed by others in 2008 (semen) and 2011 (frozen embryos). Since the initial involvement of INIA was considered too slow, Dr Vivanco was able to persuade two very important mining companies to understand and react positively to his recommendation of reorienting the sheep production towards finer wool and higher quality lamb meat using as base the Dohne. Projects with the mining companies were located at the central highlands in the Communities of Catac and Gashampampa, both above 4,000 masl, which involved the importations of more embryos from Australia in 2011 and 2013. Since there was the need to have a more controlled evaluation of the performance and adaptation of the Dohne and its crosses at the Peruvian high altitude rangeland conditions, Vivanco International SAC developed two R&D projects with this objective.

Even though good structured and organized sheep breeding programs do not exist in the country, nor performance recording systems or genetic evaluations. The current number of pure Dohne, F1 and F2 rams at the moment (less than 200), has sufficient power for a more rapid dissemination of Dohne genetics through AI and embryo transfer. It is estimated a 5 to 6 fold increase in the present farm revenues, as a result of the genetic reorientation with the involvement of the Dohne breed, and the intensification of the land use for pasture production. (Vivanco, 2014)

Brazil. Dual-purpose sheep production systems are mainly concentrated in the southern region, close to Uruguay, where temperate and subtropical climate predominates. Corriedale is the predominant breed, followed by Polwarth and Merino. However, in the last years, meat breeds have become more important. Several breeders have been using Dohne, mainly brought from Uruguay to start crossing Corriedale and other breed flocks, but not on a well organized form, and with no involvement of national research organizations. However during the last two years Brazilian breeders are showing an increased interest in knowing more about the breed, attending ram auctions in Uruguay and requesting technical information. It is likely that an increase of the importance of the breed will be seen in the future. Apparently, the importation of genetics from South Africa would be possible, representing the only country in the continent where that possibility exists.

Falkland Islands/Islas Malvinas. Located at 52° south, the islands have a very difficult environment for sheep production. The predominant breeds are Corriedale and Polwarth, with low wool cuts and lambing percentages of 60% or less. (McMaster, 2015). Stocking rates are around 1DSE every 2 ha, and animals are run on native pastures with no supplements. An abattoir was established in the early 2000, giving the farmers the access to the international meat market. In addition, there was an international decline of prices for medium to coarse wools. These 2 points provided the incentive for the introduction of the Dohne, a fine dual-purpose breed, with a reputation of hardiness, easy care, high fertility and higher prime lamb potential. In 2003, several breeders started to import embryos and semen from Australia and South Africa. After a severe process of selection for adaptation to the Falkland natural habitat, it is recognised that they have animals on the ground that have done well, and have inherited hardiness and adaptability to this environment. The main results obtained have been a big reduction of micron with little “blow out from hogget to adult, big framed meat carcass, increased lambing percentage, intelligent and easy to work with (Bernsten.B., personal communication).

REFERENCES

Abella, I., Cardellino, R.C., Mueller, J., Cardellino, R.A., Benítez, D. and Lira, R. (2010) ‘International Sheep and Wool Handbook’, pp. **85-94**, editor D.J. Cottle, Nottingham University Press, Nottingham, UK.

Benítez, D., Cardellino, R.A. and Souza, W.H. (2008) *Proc. VII Simp. Bras. Melh. Anim*

Cardellino, R.C. and Mueller, J.P. (2008) *Proc. Symp. on Natural Fibres,*

McMaster, C. (2015) ‘Birth of a breed. The Dohne Merino Story.’ Simon Says Advertising, Port Elizabeth, RSA.

Quispe, E.C., Rodríguez, T.C., Iñiguez, L.R. and Mueller, J.P. (2009) *Anim. Genet. Res. Info*.,

Tempelman, K.A. and Cardellino, R.A. Eds. (2007) ‘People and Animals. Traditional Livestock Keepers: guardians of domestic animal diversity.’

Vivanco, H.W. (2014) The introduction and development of the Dohne Merino Breed to Perú. Private Report.