



Hurdles to the expansion of sheep meat supply chain in Central Brazil

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ABSTRACT - World consumption of animal protein has increased in last decade, motivated by population growth and driven mainly by better economic conditions in developing countries. Therefore, excellent opportunities for commodities markets related to Brazilian livestock industries are constantly being created. The national Savanna area, located in Central Brazil and referred here as Cerrado, is responsible for the greatest grain production (e.g. soybean and corn) and holds the biggest commercial beef cattle herd. On the other hand, sheep production in the Cerrado is a recent activity. As consequence, some constraints issues appear to limit its growth and development. However, like other Savannas around the world, this region also presents comparative advantages and its potentials are pointed out in the present article.

Key words: integrated systems; livestock; ewe

Entraves para a expansão da cadeia produtiva de ovinos no Brasil Central

RESUMO - O consumo mundial de proteína de origem animal está aumentando nas últimas décadas, motivado pelo crescimento da população mundial e, principalmente, pelas melhores condições econômicas nos países em desenvolvimento, o que tem gerado ótimas oportunidades para as *commodities* ligadas à pecuária nacional. O Cerradobrasileiro é responsável por uma expressiva produção de grãos, além de deter o maior rebanho bovino comercial do país. A criação de ovinos na Região Central do Brasil é uma atividade ainda recente. Por consequência, alguns pontos surgem como entraves para seu crescimento e

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desenvolvimento. Entretanto, a produção de ovinos já desponta como uma nova atividade pecuária naquela região, apresentando vantagens comparativas e potenciais que são discutidas no presente artigo.

Palavras-chave: sistemas integrados; pecuária; ovelha

Introduction

World estimates for lamb production are promising. Sheep meat international prices have remained high due to a short offering and a growing demand (OECD/FAO, 2011). Despite the 8% shortage of the world sheep herd in the last 20 years, sheep meat production has increased 27% which shows that the herd has been redirected for meat production as well as evidences the extinguishment of sheep herds in some regions of the world (Sorio et al., 2010).

The world's sheep herd is estimated in 1.0 billion of heads, which is distributed all over the globe and represents an important source of high quality protein (meat and milk), fiber and other products for a diversity of countries (Perez, 2002; MDIC, 2010). The Brazilian sheep herd is estimated around 17.38 million of heads and the main states with sheep production are within South and Northeast regions presenting 28.1% and 56.7% of the total population, respectively. The Central-West region, despite having only 7.3% of the national herd, an increase over 83% in sheep heads was verified from decade 2000 to 2010 (IBGE, 2012). An anterior survey has also revealed that the sheep herd is concentrated in small-framed ranches, which have average area lower than 100 hectares and average sheep herd around 27 ewes per rancher (IBGE, 2006).

The Brazilian sheep meat production is insufficient for supplying the domestic market, even with a relatively small consumption, although it has been growing and directed for market niches in large cities where buying power is higher (Souza, 2006; Costa, 2007).



Sheep husbandry has traditionally been considered as of low commercial value in Brazil, and it is generally restricted to the informal economy. Also, ovine production is a very recent activity in Brazilian Cerrado, and although present in a large number of ranches, small ruminants production is limited and considered as a secondary activity by producers, without aiming commercial objectives (Carneiro, 2003).

The sheep meat production presents some potentials in the Cerrado, like livestock raising vocation of beef ranchers, which permits simultaneous production of cattle and sheep on the same range lands; beef market is consolidated and shows expansion in overseas exportation, thus lamb can fill any eventual gap of beef availability for internal market (Couto, 2002); it presents favorable climatic conditions associated with available pasture area and inexpensive feedstuffs such as grain byproducts.

The Central Region of Brazil has had a significant agricultural development since the 80's. The Brazilian Cerrado represents the second largest biome in the country and currently supports 40% of the beef husbandry, sustaining almost 80 million heads of cattle, and 30% of total grain production. This high grain offer, and its byproducts, has particularly attracted to the region agricultural industrial complex dealing basically with swine and poultry meat production.

Sheep meat production constraints

The administration and the organization of the sheep meat supply chain are predominantly coordinated by market which is inefficient, and the lamb meat prices end up very elevated to final consumers (Medeiros & Brisola, 2009).

The lack of experience of farmers and mostly the manpower employed in sheep production limit the increment of the productive indexes. Ovine production demands specialized manpower, especially during ewe pregnancy, lambing, and lamb feeding period in feedlot (Carrer, 2009). In addition, well trained manpower to attend the daily demands associated with



newborn lambs and sick animals identification are very difficult to obtain and demands constant investments due to training programs mainly for new hired personnel.

The cause of this problem can be associated to recent introduction of sheep on Central Brazil, when compared to other regions of the country. However, the simple adoption and implementation of the knowledge acquired from other country regions cannot be correct or so effective considering the differences on environmental characteristics between the Central-West region compared to South and Northeast regions.

Non-technological factors

Beyond labor ability limitations, which should be overcome by effective training and capacitation programs, constraints related to commercialization, tools and initiatives for organization of production and market as well as seasonality observed for both offer and demand are constantly mentioned (Análise..., 2004; Medeiros & Brisola, 2009).

The influence arising out of beef cattle traditional rangers in Central-West region, and the discussion about its market aspects (Cabral et al., 2011), despite of both being ruminant species, particularities between sheep and cattle are not often distinguished when general production management is considered (Leite & Cavalcante, 2006), and the ewe are frequently treated as a little cow.

Sheep production are pointed as an alternative to small farms and to family agriculture but studies warn to the necessity of more careful economic evaluations when small scales of production with low intensification are proposed (Espírito Santo et al., 2009). Small flocks, composed by 100-150 ewes, are usually not profitable (Barros et al., 2009) because they tend to be incorrectly handled, by low technology application, and animals end up being raised basically for subsistence matters. So, on-farm consumption of sheep products can be extremely important in specific regions.



Technological limiting points

Brazilian ovine production systems are diverse and difficult to characterize. The main models of production systems involve distinct alternatives that may vary from ewe gestation to lamb harvest stages (Otto et al., 2004).

Two specific factors have a particular influence on farmers' choice about production systems in tropical regions, that are climate and soil features.

The rainy weather in Cerrado, averaging 1.400 mm rainfall is responsible for the main sanitary problem that affects the ovine production on tropical regions causing a high gastrointestinal nematode infection. Inappropriate and frequent use of anthelmintic has led the induction of parasite resistance to almost all the commercially available deworms products (Bianchin et al., 2007). To overcome verminosis infection, management and nutritional practices towards meeting the animal protein requirements (Louvandini et al., 2006), condensed tannins rich feed (Cenci et al., 2007), phytotherapeutic applications (Chagas, 2008), homeopathic techniques (Cruz et al., 2006), nematodes fungi (Araujo et al., 2007) and animal genetic resistance aspects (Amarante et al., 2004) are among the alternatives to establish a gastrointestinal parasite control (Veríssimo, 2008).

Indeed, if environmental conditions favors pasture production in one hand, on the other it will also favor high rates of verminosis. In this challenging environment, sheep producers strive with high lamb mortality rates and/or low average daily gain.

Acid and low fertility soil conditions prevailing in Cerrado has favored *Urochloa* (*Brachiaria* spp.) grass species spreading among the cultivated pastures areas. Despite of the use of brachiaria grasses are not recommended for sheep growing, for the presence of anti-



nutritional factors as steroidal saponines (Brum et al., 2007), and the fungi *Pithomyces chartarum* (Tokarnia et al., 2000), which may cause photosensitization, livestock exploration in Central Brazil is greatly based on these type of pasture. The estimation of *Brachiaria* spp. planted in Brazil is around 95 million of hectares, in which hepatic photosensitization cases of bovine and ovine grazing this type of grass are reported (Brum et al., 2009). Complementarily, greater incidence of the disease is particularly observed in weaned lambs. Moreover, it is also verified seasonal occurrences, probably due to variations on saponins levels in grasses throughout the year. Individual animal variation related to susceptibility has been observed in field conditions, thus genetic studies should be conducted to elucidate and explore possible genetic variations (Souza et al., 2010).

As above mentioned, sanitary difficulties involving gastrointestinal nematode infection, and the prevalence of *Urochloa* among tropical grass species in Cerrado pasture areas, causing photosensitization, has greatly affected production systems because of high mortality indexes verified mostly in weaned lambs, consequently leading the farmers to adopt feedlot as a unique and generalized practice in order to counteract these trends (Siqueira, 2003; Moreira et al, 2009). Great research effort has been directed to this issue in the last decade which has been identifying the elevated costs with feeding and manpower (Ziguer et al., 2011). In order to minimize lamb production costs in feedlot, alternative feedstuffs (Nunes et al., 2007), grain, biodiesel and ethanol byproducts (Mendes et al., 2010; Ferreira et al., 2011; Piona et al., 2012), and complete grain diet are investigated (Queiroz et al., 2008).

To keep lamb growing under pasture conditions nutritional factors must be considered (Carvalho et al., 2011). The performance in these cases is poor and might be improved with concentrate supplementation (Andrade et al., 2007), but economic return are inferior to feedlot (Siqueira et al., 2003; Macedo et al., 2000). However not only the quality of nutritional



supplements or levels provided in relation to the live weight should be taken into consideration. The genetic pattern of the animals used in experiments, the availability and the provision of fodder, the resting period of the pasture without a sheep, and especially the monitoring of parasitism ought to be questioned.

Even facing the low weight gain and feed conversion of lambs (Almeida et al., 2012), the importance of studies considering concentrate supplementation of animals under pasture conditions cannot be neglected. Ideally, supplementation should be investigated for ewes focusing reproductive matters (Barbosa et al., 2003), and female hogget which will be incorporated back in the flock as future matrice.

Considering that the maintenance cost of the ewes cause a strong impact on the profitability of the sheep farming system (Morais & Madalena, 2066; Lôbo et al., 2011; McManus et al., 2011;) this strategy may be of fundamental importance in the rearing of lambs.

Genetic Animal Improvement

According to Morais (2000), low commercial value in sheep husbandry has determined that Brazilian sheep products such as wool, meat and hides, are uncompetitive compared to other countries, which invested in genetic improvement of production traits and conservation of national breeds. While individual farmers or groups of farmers have carried out selection within individual flocks, long term breeding programs are scarce in Brazil (McManus et al., 2010). A critical deficiency in traditional animal breeding practices may be pointed out to management, nutrition or environmental in Central Brazil conditions. Native sheep raised under harsh conditions have shown adequate fertility rates, 90.13%, and twin lamb born frequency of 12.63%, but in detrimental of an adequate short production cycle presenting age at first lambing averaging 588.58 days and parturition intervals of 337.94 days (Miranda & McManus, 2002). The point is that indigenous sheep may have the potential to serve in a greater capacity, either as



purebred populations or in a crossbreeding scheme, when appropriate breeding programs are designed and carried out for sufficient periods of time (Blackburn, 1990). Whatever the production system, the adoption of selection criteria for ewes and rams is essential for achieving the desired results and the breeding programs need further improvement (McManus et al., 2010). The influences of genetics and breeding strategy have been reported in performance evaluations (Furucho-Garcia et al., 2004) and carcass analysis (Chagas et al., 2007). It is necessary to have ewes with superior maternal ability suitable for lambing and, moreover, to weaning of lambs with the highest possible weight. In intensive systems it is recommended to adopt the reproductive management as a strategy to increase the number of lambs produced during the ewes' production lifetime, which can be achieved by a higher incidence of twin pregnancies, defined as an index of prolificacy, the anticipation of age at first lambing and by decreasing the interval between parturition (Sá & Sá, 2003).

Management aspects

The practice of lamb supplementation, named creep feeding, is used either to supply nutritional deficiencies of pasture or to improve ewe nutritional status, by decreasing lamb pressure on milk intake. In addition, creep feeding is a strategic supplementation administrated during a high growth potential phase with the objective of getting heavier weaned lambs to submit them to feedlot (Bernardi et al., 2005), when weight increased gains can be estimated by 10 to 20% (Neiva et al., 2004).

Advances in animal production indices have been found in studies held along the years with the use of creep feeding improving born weight, from 3,8 kg to 5,6 kg, average daily weight gain, from 371 g to 443 g, carcass dressing percentage, from 49,6 % to 51,9 %, and reduced slaughtered age, from 78 days to 56 days (Garcia et al., 2003; Garcia, 2007).

Other strategies are not directly related to the adoption of technologies but to systems



organization, and could be considered as an innovation because it does not necessarily involve increased expenses. The controlled suckling of lambs is an important tool once it plays a positive effect on live weight (kg) of lambs weaned per ewe (Assis, 2009), as a result of the higher weight gain during the first 60 days of age (Leite et al., 2010).

Integrated systems

The introduction of the sheep industry as an alternative component of livestock in integrated production systems can meet some interesting purposes: to explore the habit of grazing sheep and their preference for herbaceous plants, eliminating them from the crop; providing the return of manure and fertilization of the crop; to bring benefits to livestock by breaking the cycle of pests and diseases, the rapid termination of the animals, raising the daily weight gain, and a greater economic return to the diversification of production.

Mixed sheep-cattle grazing

The mixed grazing with sheep and cattle might optimize the use of pastures based on differences in grazing behavior between ruminants within the same forage resource, as verified in native pastures (Nolan & Connolly, 1977; Araújo Filho & Crispim, 2002). The mixed grazing can be done simultaneously or in successive periods of time, depending on the objectives, management, and the species involved (Silva Sobrinho, 2007). According to Carvalho et al. (2005), the mixed grazing also improves the forage use by the complementarities between species grazing the same pastures with the integration of beef cattle-sheep farming. This advantage diminishes as the pasture is composed of a smaller number of plant species, because it reduces the chances of choice, and when bovine/ovine proportion is not ideal stimulating the competition for the fodder. The more efficient utilization of forage occurs when using the proportion of five sheep for each cattle per hectare (Carvalho et al. 2005).

Integrated grazing systems provided a 24% increase in meat production when compared to



cattle-only grazing system and by 9% compared to sheep-only grazing (Walker, 1994). Lambs grazing pastures alternately with cattle showed higher productivity and it was attributed to quantitative and qualitative improvement in the pasture also used by cattle (Moss et al., 1998). Similarly in the Caribbean, lambs and heifers kept under mixed grazing conditions showed higher weight gains than groups of animals kept in separate pastures. The increased productivity was associated not only with the lower *Haemonchus contortus* infection rates in sheep, but also with improved pasture quality (Mahieu et al., 2008). Such results indicate that further studies are needed to assess the impact that mixing of different herbivore species has on pasture quality in Central Brazil (Rocha et al., 2008).

Simultaneous or alternate grazing with sheep and cattle is a more effective tool in verminosis controlling as compared with exclusive sheep rotational grazing, but benefits of decontamination were not sufficient for proper prophylaxis of parasitic gastroenteritis (Carvalho & Rodrigues, 1997; Amarante, 2004; Poli et al., 2008; Torres et al., 2009), although desirable lesser deworms application was verified (Fernandes et al., 2004).

Integrated crop-livestock systems

The silvopastoral systems and crop-livestock integrated farming system (CLI) are also important alternative, and potentially raise the standard of qualitative and quantitative benefit of fodder for sheep.

Associated with increased social, economic and environmental pressures that limit the opening of new forest areas, a relevant factor is the advance of sugar cane cultivation over pastures cultivated areas, which may reduce available area for extensive livestock production, and consequently it will require smaller production modules that must be conducted with higher production efficiency. The CLI is a rational exploitation of farming systems, and can be defined as diversification, rotation, intercropping and/or successive activities involving agriculture and



livestock (Alvarenga e Noce, 2005). In forest plantations areas managed with cattle and sheep the control of grasses, major weeds occurrence, reduced the maintenance cost of the crop (Almeida, 1991; Couto et al., 1994). Intercropping of sheep and cattle with *Eucalyptus citriodora* besides providing a reduction of 52% to 93% on the cost of maintaining the culture, did not affect tree growth and soil compaction was not observed with a stocking rate of 1 Animal Unit/ha/year.

Research evaluating sheep farming in crop-livestock-forest systems on Cerrado conditions is scarce and consequently demanding a special focus on trials aiming to refine integration techniques and to develop new types of high production grasses.

Concluding remarks

There is a great potential for sheep industry development in Cerrado. Yet considered a second activity on livestock farming, there are constraints to the sheep meat supply chain development that are difficult to dimension and prioritize. The organization of lamb meat production to meet market demands will take an effort to reduce production cost and increase profit with higher technology level adoption for sheep production systems in Central Brazil. An interesting opportunity relies on integrated systems that have been widely disseminated in the region, and sheep could be included as the animal component in crop-livestock-forest systems.

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