STRATEGIES FOR INCREASE MEAT PRODUCTION IN ARGENTINA: ECONOMIC ANALYSES

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Abstract – The aim of the present research work was to look for new beef production strategies in order to improve byproducts quality and to include alternatives according to beef demand for domestic consumption and international markets. Cows with very early weaned calves (thirty days), grazed on pasture, and cows with traditional weaning (seven months), grazed on pasture and finished in feedlot, were studied. Holstein male calves with different slaughter weights were investigated. Rations fed included whole corn and commercial concentrate (70 and 30 % respectively). Cull cows and Holstein male calves produce meat with acceptable quality attributes. A valuable additional income comes from the increased the number, weight and carcass quality of cull cows increasing the number of replacement heifers and the possibility of culling 5 year old cows with better quality beef. Meat from Holstein male calves was accepted by local consumer. The local market showed a preference for smaller sized cuts with no visible fat and light color meat. Cull cows and Holstein male calves could be important alternatives to beef production systems to increase meat production and satisfy the high quality meat demand of the local and international markets.

Key Words – Cull cows, Holstein male calf, Meat quality

I. INTRODUCTION

Historically, beef cattle production has been one of the traditional activities and an important contribution to the economic growth of Argentina. This activity led the country to being inserted in the international market as a beef supplier, and became in the past one of the world's largest beef exporters. Also, Argentina has one of the world's highest per capita levels of beef consumption. Since 2007, a sharp decline was recorded in cattle stock which, by 2010 had decreased by nearly 10 million head [1].

Culls cows are a byproduct of cow-calf operations which could attain a great economic relative importance because of lower production costs compared to traditional products costs. It could be an alternative investment oriented to improved traditional nutrition systems in cow-calf operations which are not presently available in commercial operations. It could either be a deferred grazing system on native pasture or improved sown pastures or even concentrate supplementation. The first fattening alternative is a guarantee to better functional properties (increased polyunsaturated fatty acids).

Male Holstein calves are considered as a "byproduct" of milk production units and most of the time it does not pay to grow and feed them, feeding and care is only concerned with heifer calves. Consequently, Holstein calves are killed at birth in many farms.

Meat is an important source for some micronutrients such as iron, selenium, vitamins A, B12, and Folic acid. These micronutrients are either not present in plant derived food or have a poor bioavailability. In addition, beef as a protein rich and "low" carbohydrates product contributes to a low glycemic index which is assumed to be "beneficial" with respect to obesity, diabetes development and cancer [2]. Moreover, ruminants meats are natural supplier of *n*-3 polyunsaturated fatty acids and conjugated linoleic acids (CLAs), which may have a range of nutritional benefits in the diet [3]. Looking to increase Argentina's beef production,

to fulfill both domestic consumption and exports, is a constant aim in beef production research.

II. MATERIALS AND METHODS

Animals and experimental design:
Cull cows: Treatments were previously published by Biolatto *et al.* [4]. Briefly, thirty Hereford and Polled Hereford cows from the Concepción del Uruguay (INTA) Experimental Station herd (5.5 – 6.0 frame) were allotted to two weaning treatments. Cull cows with very early, one month, weaned calves (CVEW) and cull cows with traditionally, seven months, weaned calves (CTW). All cows were grazed on native pasture, mostly C4 species, established in the Experiment Station (32°29'28" S; 58°20'49" W, 25 m above mean sea level) in the Province of Entre Ríos in Argentina. Cows from CTW were finished in feedlot to attain the same body condition and slaughter weight of treatment CEVW.

Holstein male calves: The production system involved two different periods: 1) A milk feeding period and 2) A fattening period. The first one lasted 28 days and included Ruter® in the ration and the second included a training period to adapt the animal to whole grain corn in the ration (10 days). The rest of the period (between 160 and 200 days depending on the slaughter weight) included whole corn and a protein concentrate (40% GP) with a 90:10 (relationship) corn:concentrate relationship fed *ad libitum*.

III. RESULTS AND DISCUSSION

Intensified cow-calf operation means a larger number of cows per surface unit and the possibility to cut down contamination by removing the calf while the rumen is not operating (very early weaning, 30 day old calves) and feeding the calf concentrates and top quality pastures until it weighs somewhere between 250 and 300 kg or selling it before as a "backgrounded calf". This sort of operation is referred mostly to small farms with somewhere between 100 to 200 cows. The other chance to fight CH4 contamination is to increase the number of calves produced with the same amount of methane emission because of the increase in calf crop produced by very early weaning attaining a 90% pregnancy rate. On the other hand very early weaning stimulates native pasture conservation because it allows the use of deferred grazing or to use corn or sorghum stubble under short term rotation to prevent soil compaction or even a better agriculture rotation with perennial pastures. In other research works Galli *et al.* [5], Perlo *et al.* [6], Teira *et al.* [7], demonstrated that the early (60 day old calves) and very early weaning system does not only improve cow reproductive behavior but also could produce acceptable quality cull cow meat. Furthermore, the nutritional beef quality results published by Biolatto *et al.* [4] showed that meat from cull cows with very early weaning, raised exclusively on pasture, had higher components levels reported beneficial to human health. A valuable additional income comes from the increased the number, weight and carcass quality of cull cows increasing the number of replacement heifers and the possibility of culling 5 year old cows with better quality beef.

A real cow-calf system with 22 hectare perennial pasture, 30 hectare stubble or native pasture and 60 cows was run with a 90% calf crop and the economic results were: Gross margin per hectare: US$ 204.52, net profit per cow US$ 145.74 which, under local conditions might be regarded as satisfactory.

In Argentina, male Holstein calves are generally considered as a "by-product" of milk production units. When the technology here described was developed male Holstein calves were beheaded at birth in many farms. USA has an abundant experience in rearing and marketing special fed calves [8], [9], [10]. A document in the Department of Agriculture in Argentina excluded these calves from the minimum slaughter weight required for all other categories. This legal facility plus an increased demand of feedlot and grazing finishing operations helped to put these special fed calves in the market. The degree of finishing depending on the production of slaughter or stocker calves to supply the increased demand in both. This paper deals with special fed slaughter calves.

In order to determine the slaughter weight there was a previous 6 years research work to determine the relationship between slaughter weight and

conversion efficiency, killing out percent, carcass quality and market demand. Three slaughter weights were evaluated: 220 (LW), 260 (MW) and 290 (HW) kg. It was found better conversion efficiency with smaller slaughter weights with very good average daily gain (ADG) and acceptable killing out percents (Table 1).

Table 1 Field results of male Holstein calves with different slaughter weights

	LW	MW	HW
IW, kg	72,9±7.3	70.1±5.4	71.0±12.4
FW, kg	240.8±12.5	270.8±13.2	293.8±14.0
ADG, kg/day	0.97	1.04	1.02
CE, kg feed/kg gain	3.04	3.10	3.28
KO, %	50,5	54,0	53,7

LW: light weight, MW: medium weight, HW: heavy weight, IW: initial weight, FW: final weight, CE: conversion efficiency, ADG: average daily gain, KO: killing out

Quality attributes analysis of this assay showed that slaughter weight did not promote significant differences in *longissimus* muscle area, pH, protein, total lipid and sensory traits. However, the light and medium slaughter weights had the lowest subcutaneous fat thickness and marbling score values. Related to the meat nutritional quality, medium and heavy slaughter weights presented the higher amino acids and intramuscular saturated fatty acids values which came out to be less than published values for other categories Biolatto *et al.* [11].

In other experience, with similar initial body weights (between 57.1 and 59.2) animals made an average of 221.8 kg, 263.2 kg and 286.9 kg for light, medium and heavy slaughter weights, respectively, and the corresponding ADG were 1.24, 1.29 and 1.26 kg, the CE were 3.62, 3.98 and 4.34 (kg feed per kg gain). Killing out percents were 53, 53 and 54 for light, medium and heavy animals respectively.

The market response showed a preference for smaller sized cuts, no visible fat and light color meat and paid top prices in the market. Gross margins per kg produced were US$ 0.91, 0.87 and 0.83 for light, medium and heavy slaughter weight calves. The economic analysis was run on April 2011.

IV. CONCLUSION

Food production will highly increase in the near future and Argentina's beef-producing sector will have the necessary technology to improve efficiency and to increase cattle stock and meat quality.

Results presented evidenced that meat production systems from cull cows and male Holstein calf could be good strategies not only to increase meat production but also to add by products value.
Beef market, local and international, could be partially satisfied by an improved cull cows beef quality, presently used mainly for canning products, and male Holstein calves will supply a top quality byproduct to milk production units, increasing system stability.

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