

COUNTRY: BRAZIL

SESSION: SMALL RUMINANTS PRODUCTION

Corporal components of crossbred lambs born to Corriedale and Polwarth ewes mated by a Texel ram

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ABSTRACT

This study aimed to investigate the effect of crossing Corriedale and Polwarth ewes with Texel rams on corporal components evaluated as absolute (kg) and percentile basis, in lambs raised in native pasture and slaughtered in two consecutive years. A total of 48 non-castrated lambs were utilized, being 24 (13 Corriedale x Texel – CT and 11 Polwarth x Texel – PT) slaughtered per year. In the first year, lambs were not given a supplementary diet and were slaughtered at 127 days of age (December). In the following year, lambs were supplemented and slaughtered at 180 days of age (March). Animals were weaned at 70 days of age. Internal fat (kg or %) was significantly higher in PT lambs in the first year. In the second year, the PT lambs showed higher internal fat (kg and %), green viscera's (kg) and heart (%). Year, either in kg or in %, and a breed effect for internal fat and heart (kg or %) affected most of corporal components, with PT lambs showing higher averages. These results indicate that genetics and environment may influence corporal components.

KEYWORDS

Carcass, meat, lambs, genotype, sheep

INTRODUCTION

The sheep industry is an important economical activity in Rio Grande do Sul state, Brazil. Corriedale and Polwarth are the main breeds raised (80%) in this state. However, there is a lack of information concerning meat production of these animals. Paternal breeds specialized in meat production, when crossed with local adapted breeds, may be an alternative to increase meat production of lamb during the year (OSÓRIO et al., 2000).

Carcass is the main corporal component. However, there are others that serve as feed source and/or show maternal to the industry. Therefore, to evaluate the animal as a whole would be fairer, once the remaining of the corporal components may represent a more important part than the carcass itself (FRAYSSE and DARRE, 1990).

COSTA et al. (1999) showed higher absolute values to hot carcass weight, legs, green viscera's and empty viscera in Texel lambs as compared to Corriedale and Polwarth lambs, with by their turn show higher skin value. OSÓRIO et al. (2002)

concluded that Border Leicester x Corriedale lambs had higher skin, than Border Leicester x Polwarth lambs, either absolutely or percentile values. The authors attributed this effect to higher length and thickness of Corriedale breed. According to MENDONÇA et al. (2003), Corriedale lambs show higher live weight at slaughtering, legs and lungs and trachea than Polwarth lambs, but Corriedale lambs had higher internal fat.

MATERIAL AND METHODS

This study was conducted at Embrapa Pecuária Sul (CPPSUL) in Bagé – RS, Brazil and in the laboratory of the Departamento de Zootecnia, FAEM – UFPEL, Pelotas – RS. The laboratory methodology was the one described by OSÓRIO et al (1998). Data of lambs from Corriedale and Polwarth ewes with Texel rams were obtained during two years of consecutive years of slaughtering. A total of 48 lambs (13 Corriedale x Texel – CT and 11 Polwarth x Texel – PT) were used. During the first year, the lambs were kept on native pasture, without a supplemental diet. The animals were slaughtered at 127 days of age (December). During the second year, the animals received a supplemental diet and were slaughtered at 180 days of age (March). The animals were weaned at 70 days of age.

After 14 hours fasting and before slaughtering, the animals were weighed (live weight at slaughtering). Right following slaughtering, hot carcass, head, paws, skin, heart, lungs with trachea, spleen, liver, internal fat, diaphragm, full green viscera's, testes, penis and bladder weight was obtained. The relative body weight of each organ was recorded.

Following force-air cooling at 0°C, during 17 hours, cold carcass weight, pelvic and renal fat and kidney weight were recorded.

The data was analyzed using PROC GLM (General Linear Models) of the Statistical Analysis System program (SAS, 1982).

RESULTS AND DISCUSSION

The PT lambs showed higher internal fat, either absolute (kg) or relative (%) weight in the first year ($P < 0,05$). The same tendency was observed in the second year, as well as, higher values for green viscera's (kg) and heart (%) were observed ($P < 0,05$). According to MENDONÇA et al. (2003) and COSTA et al. (1999), the Polwarth breed is more precocious than the Corriedale, being able to store more fat in less time.

Most of corporal components were affected by year effect (Table 1), either in kg or in percentage. Internal fat and heart (kg and %) were higher in PT lambs (Table 2). SANTOS-SILVA et al. (2002) indicated that lambs fed a dietary supplementation during the finishing phase show a higher growth rate, decreasing the slaughtering age, without affecting meat quality. The raising system influences the lambs development, affecting the product quality (OSÓRIO et al., 1999; JARDIM et al., 2000).

CONCLUSION

Corporal components are influenced by genetic and environmental traits.

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COUNTRY: BRAZIL

SESSION: ADVANCED TECHNIQUES AND WELFARE

RELATIONSHIP BETWEEN GENOTYPE AND TEMPERAMENT OF BEEF CATTLE 1

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ABSTRACT

Application of management strategies that consider behavioral characteristics of cattle may improve meat production. Cattle with genotype *Bos taurus indicus* or crossed bred tended to be more reactive than *Bos taurus taurus*. Seventy nine steers, aged of 19-20 months, were classified into eight genotype groups with increasing Charolais blood: CH (100CH), $\frac{3}{4}$ CH1/4N (0,75CH), 11/16CH5/16N (0,69CH), 5/8CH3/8N (0,63CH), 3/8CH5/8N (0,38CH), 5/16CH11/16N (0,31CH), 1/4CH3/4N (0,25CH), N (0CH). Steers were fed a diet with 50% corn silage and 50% concentrate. Steers were weighed each 28 days, when temperament was evaluated through behavior score (BC), flight speed test (FT) and flight distance (FD). BC was attributed 10 seconds after animal entry in the scale and considered movement, intensity of breathing, vocalizations, kicks. FT was performed when steers exit the scale and measured time spent to move over a 2 meters distance. FD was performed 30 seconds after steers exit from the scale to a yard, and the observer measured the distance that the animal allow to be approached. Position of the facial whorl was determined. Steers 0CH and 0.31CH presented largest values for BC, while 100CH and 0.69CH showed the smallest. Steers 100CH presented largest FT. Steers 0.31CH presented larger values for FD, while 100CH showed smaller values. As Nelore blood proportion increased, facial whorl tended to be located in a proximal position. It might be concluded that as Charolais blood proportion increased, steers were less reactive and facial whorl was located in a distal position.

KEY WORDS: genetic group, reactivity, behavior, facial whorl

INTRODUCTION

Animal reactions to handling by man were probably an important aspect in the choice of which animals could be domesticated. Recently, researchers and producers are concerned with reactivity of animals to handling during usual farm management situations and they have been used these behavioral responses to evaluate animals temperament. Producers have been interested in tamed animals and, they have selected empirically in that way. Temperament may be defined as the reactions of the animals to man or management, generally modulated by fear (Fordyce et al., 1982). Fear is a universal emotion in the animal kingdom and motivates animals to avoid predators. However, fear and anxiety are undesirable emotional states as it promotes stress and decrease in animal welfare (Paranhos da Costa, 2001). Temperament therefore affects economical aspects of animal production, as highly agitated animals may suffer more injuries, present lower performance and poorer meat quality, harm farmers and other workers and so on. Some studies reported that *Bos indicus* cross steers are more agitated than *Bos*

taurus (Zavy et al., 1992), but other as Kabuga e Appiah (1992) did not verified significant differences between these genotypes. The last authors suggested that previous experience and raising conditions are more important than genetic aspects to determine temperament. This trial aimed to relate genotype to temperament.

MATERIAL AND METHODS

Seventy nine steers, aged of 19-20 months, were classified into eight genotype groups with increasing Charolais blood: CH (100CH), $\frac{3}{4}$ CH1/4N (0,75CH), 11/16CH5/16N (0,69CH), 5/8CH3/8N (0,63CH), 3/8CH5/8N (0,38CH), 5/16CH11/16N (0,31CH), 1/4CH3/4N (0,25CH), N (0CH). Steers were lot fed and received a diet with 50% corn silage and 50% concentrate, formulated to allow an average daily gain of 1,15 Kg. Steers were weighed each 28 days, when temperament was evaluated through behavior score (BS), flight time test (FT) and flight distance (FD). BS was attributed 10 seconds after animal entry in the scale and considered movement, intensity of breathing, vocalizations, kicks. BS was measured at five dates, at intervals of 28 days. High BS indicate agitated animals. FT was performed when steers exit the scale and measured time spent to move over a 2 meters distance. FT was measured at 4 dates. Low FT values indicate agitated animals. FD was performed 30 seconds after steers exit from the scale to a yard, and the observer measured the distance that the animal allow to be approached. FD was measured at 3 occasions. Large FD indicate agitated animals. Position of the facial whorl was determined as below eyes levels, at the eyes level and above eyes level, according to methodology described by Grandin et al. (1995). The trial was conducted at Animal Science Department of Federal University of Santa Maria, RS, Brazil. Animals were allocated randomly to treatments according to a completely randomized design. Data was analysed by variance analysis, with SAS statistical program (version 6.12), procedure GLM and separation of means was according to SNK test.

RESULTS AND DISCUSSION

There was a significant difference for BS1 and BS5 (table 1) between animals with low proportion of Charolais blood, 0CH and 0.31 CH, and those with high proportion of Charolais blood, 0.69 CH and 100 CH. Animals with higher proportion of Nelore blood presented higher values for BS, while those with higher proportion of Charolais blood showed lower values for BS. These results are in agreement with Grandin (1997), that reported differences in the temperament between Bos indicus steers crosses, and those with a higher Bos indicus blood proportion tended to be more stressed during handling practices. However, the present results disagreed with McIntyre and Ryan (1986) that did not find differences between genotypes kept in a feedlot for susceptibility to stress, growth or meat quality. Fordyce et al. (1988) observed that heavier animals among Bos indicus steers cross were those classified as docile or tamed. According to the last authors, agitation may increase difficulty in handling practices and costs, as it might be needed better facilities and better trained workers. A significant difference was detected for flight time test, which was higher for 100CH at first and third date of measures (table 2). Burrow (1991) determined that animals with FT lower than 0.7 s may be classified as agitated, while those animals with FT higher than 0.9 s may be classified as docile. According to Boissy (1995), some individuals are cautiousness and fearfulness

while others are docile and tamed. Fear is a universal emotion in the animal kingdom and motivates animals to avoid predators.

FD was significantly different at the three measurement dates (table 3). Steers 0.31 CH showed larger values compared to steers with 100 CH. These results are in agreement with Burrow (1991) and Becker (1994), that reported *Bos taurus* steers showed smaller FD than *Bos indicus* cross.

As the proportion of Nelore blood increased, facial whorl was located above the eyes level (table 4). These results are in agreement with Grandin (1995) and Lanier et al. (2001), that reported that the most excitable presented facial whorl above eyes level.

CONCLUSION

Steers with increasing proportion of *Bos indicus* genotype were more reactive than those with a greater proportion of *Bos taurus* genotype.

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COUNTRY: BRAZIL

SESSION: ADVANCED TECHNIQUES AND WELFARE

EFFECTS OF GENOTYPE UPON TEMPERAMENT AND LIVE WEIGHT GAIN OF BEEF CATTLE¹

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ABSTRACT

Genotype may affect temperament and live weight gain of beef cattle, modulating animal reactivity submitted to management practices. The effect of two genotypes, *Bos taurus taurus*, Aberdeen Angus (AA) and *Bos taurus taurus* x *Bos taurus indicus*, 50% Aberdeen Angus + 50% Nelore (NA), upon temperament were evaluated with 40 steers (n=20), aged of two years and initial live weight of 336,4 ± 3,6 Kg, allocated randomly to treatments according to a completely randomized design. Steers were kept in paddocks of natural grassland and were supplemented with commercial concentrate in an equivalent amount of 0.5% body weight. Steers were weighed each 28 days, when temperament was evaluated through behavior score (BC) and flight speed test (FT). BC was attributed 10 seconds after animal entrance in the scale and considered movement, intensity of breathing, vocalizations, kicks. Higher scores indicate greater reactivity. Flight speed test was performed when steers exit the scale and measured the time spent to move over a 2 meters distance. Shorter times usually indicates higher reactivity. Steers AA showed smaller values of BC at all weighings than steers NA, respectively, 1.1 x 3.2; 1.1 x 2.6; 1.0 x 2.0; 1.1 x 1.7; 1.0 x 1.7. Steers AA presented larger values than NA for FT, at first and fourth weighings, respectively, 2.1 x 1.3 and 4.7 x 2.3 seconds. Daily weight gain was related to BC (r= -0,33, P=0,0356) and FT (r= 0,31, P= 0,0489). However, no significant differences for daily weight gain were detected between genotypes.

KEYWORDS: Temperament, genotypes, reactivity, weight gain

INTRODUCTION

Individuals react to distinct situations according to their temperament, which is the result of complex interaction of hormonal, neural and physical aspects.

Temperament might be defined as the expression of how animals perceive and react to potentially fearful stimulus (Boissy & Bouissou, 1995). Cattle with excitable temperament show 10 to 14% less weight gain than calmer cattle (Voisinet et al.,

1997). Animals that exit slowly the squeeze chute present larger weight gain than those that exit rapidly (Burrow & Dillon, 1997). Cattle kept in pens which were previously classified as nervous according to flight speed test gained less weight, ate less frequently, were more susceptible to illness and differed in the resting behavior and spatial use of the yard (Kilgour, 1998). Borba et al. (1997) verified positive relations between flight distance and weight gain for steers partially confined and between flight distance and weight at 550 days of age. This trial aimed to evaluate the temperament of beef cattle from different genotypes, raised extensively on a rangeland and supplemented, upon live weight gain.

MATERIAL AND METHODS

This trial was conducted in private farm located at Alegrete, Rio Grande do Sul State, Brazil. Forty steers from two genotypes *Bos taurus taurus* (Aberdeen angus, n=20, AA) and *Bos taurus taurus* X *Bos taurus indicus* ($\frac{1}{2}$ Aberdeen angus x $\frac{1}{2}$ Nelore, n=20, NA) aged of two years, initial live weight of 336.4 \pm 3.6 kg, were used. The steers were kept at paddocks of rangeland, and supplemented with commercial concentrate at an amount equivalent to 0.5% of body weight. Steers were weighed at intervals of 28 days, when temperament was evaluated through behavior score (BC) and flight speed test (FT). BC was attributed 10 seconds after animal entrance in the scale and considered movement, intensity of breathing, vocalizations, kicks. Higher scores indicate greater reactivity. Flight speed test was performed when steers exited the scale and measured the time spent to move over a 2 meters distance. Shorter times usually indicates higher reactivity. Animals were allocated randomly to treatments according to a completely randomized design. Data was analysed by variance analysis, with SAS statistical program (version 6.12), procedure GLM and separation of means was done using lsmeans.

RESULTS AND DISCUSSION

Steers AA showed smaller values of BC at all weighings than steers NA, respectively, 1.1 x 3.2; 1.1 x 2.6; 1.0 x 2.0; 1.1 x 1.7; 1.0 x 1.7 (Table 1). Cattle *Bos taurus indicus* and crossbreeds may show excitable temperament when compared to *Bos taurus taurus* (Becker & Lobato, 1997). According to Burrow (1997), handling of *Bos taurus indicus* and crossbreeds animals is more difficult compared to *Bos taurus taurus*, but he recognized differences among breeds. Steers AA presented larger values than NA for FT, at first and fourth weighing, respectively, 2.1 x 1.3 and 4.7 x 2.3 seconds (Table 2). When FT was used to choose animals for breeding programs, individuals with more than 50% of *Bos indicus* blood were not desirable (Burrow & Corbett, 2000). According to Grandin (1993), agitated behavior is very persistent over time, and extreme temperament scores tended to be highly persistent for both calm and agitated cattle. However, it is likely that both previous experience and genetic factors contribute to agitation levels. Daily weight gain was negatively related to BC ($r = -0.33$, $P = 0.0356$) but it was positively related to FT ($r = 0.31$, $P = 0.0489$). Voisinet et al. (1997) reported that higher behavior scores are related to decreasing body weight gains. However, no significant differences for daily weight gain were detected between genotypes.

CONCLUSIONS

Bos indicus crossbreed steers were more agitated and show smaller body weight

gains than *Bos taurus* cattle.

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COUNTRY: BRAZIL

SESSION: ADVANCED TECHNIQUES AND WELFARE

EFFECTS OF GENOTYPE AND TEMPERAMENT OF BEEF CATTLE ON POST MORTEM METABOLISM¹

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ABSTRACT

Post mortem metabolism may be affected by temperament and genotype, since larger scores of temperament are associated to greater incidence of DFD meat (dark cutting), caused by larger ante mortem muscle glycogen use due to an increase in movement or shivering. The effect of Aberdeen Angus {AA} genotype and AA x Nelore (NA) cross breeding was evaluated in 30 two-year-old castrated male carcasses, slaughtered in a commercial slaughtering house. The pH1, pH3, pH4, pH7, pH12 and pH24 post mortem were evaluated. The temperament was evaluated during the weighing of the animals, through the determination of behavioral score, during the first 10 seconds of the entering of the animal in the scale. Lower values indicated less reactive animals and run away speed (RS), evaluated through the period of time used to run 2 meters in the exit of the scale. The higher values indicated less reactive animals. Higher behavioral score animals showed less pH1 values (6.47, 6.28 and 6.09 to behavioral score 1, 2 and 3, respectively). However, animals with higher behavioral scores showed higher values of pH12 (5.69, 5.48 and 5.75 to behavioral score 1, 2 and 3, respectively). The NA animals showed lower pH1 than the AA ones, respectively, 6.17 and 6.57. These results indicate that temperament and genotype influence the post mortem metabolism, in which more reactive crossed bred animals showed low initial values or high final of pH.

KEYWORDS: Metabolism, genotype, pH post mortem

INTRODUCTION

There are actually an increasing of consumers' preoccupation with environmental adaptation and welfare of animals for producing meat with high quality. As suggesting by Dumont (1992), the meat industrial sector must be perform programs of quality certifications for commercial regulation of animals and their meat value, consequently. The welfare of animals is very important for their growing and development, and any problem with stress's agent as excessive movement, dispute, inadequate transportation or handling, before slaughter could alter the muscle post mortem metabolism. According to Grandin (1980), the psychological agents that cause animal fear are more important than the physical stressors for modifying the quality of meat. By comparing groups of calm and excitable bovines Petherick et al. (2002) have demonstrated that the last one were the most liable to pre-slaughter handling conditions, specially exhibiting low values of post mortem initial pH. Moreno-Grande et al. (1999), have found a high percentage (42%) of bovine carcasses with pH24 hour (ultimate pH) values over 5.8, which were independently of animal age, sex or carcass weight. Then, the stress was the main inductor for increasing first hour glucolysis rate of bovine muscle. This work evaluates the temperament of two genetic groups of bovines and its effect on post mortem metabolism.

MATERIAL AND METHODS

The temperament and genotype of thirty castrated males, of which 19 Aberdeen Angus (AA) and 11 crossbreeds (Aberdeen x Nelore), slaughtered at age of 24 months, were evaluated in relation to post mortem metabolism. All animals were breeding in an extensive regime (pasture) with a feed supplementation using a commercial concentrated (0.5% animal weigh daily) in a farm located in Alegrete, RS, Brazil. The pH was evaluated at 1, 3, 7, 12 and 24 hour of post mortem metabolism using the Sternomandibularis muscle (5g) and iodoacetate 0.01M as buffer to inhibit glucolysis (Bendall, 1973). The samples were ground and homogenized during 30 sec (Turrax Homogenizer) and the lecture in a pHMeter (Analion, mod. PM602) was performed at 20°C. Temperament scores were obtained during the animals' weighing, at each 28 days, by means of comportment scores (CE) in the first 10 sec after their entrance in the scales. The CE low values scores indicated animals with less reactivity and for the exit speed (VS), which refers to the time spent to move a 2 meters distance, after the animal weighing, is inverted, low time means high reactivity. Data was analyzed by variance analysis with SAS statistical program (version 6.12), procedure GLM and separation of means was done using lsmeans.

RESULTS AND DISCUSSION

There were found significant differences in post mortem first hour pH (pH1) among animals. All animals with low values of pH1 (Table 1 and 2) had the lowest values of exit speed (VS) and the highest comportment scores (EC). These results are similar to those found by Petherick et al. (2002), during pH evaluation of bovine post mortem metabolism, whose animals were handled on different conditions in relation to their temperament. The values of pH12 had a slight increase (Table 1) for the bovine groups with the highest comportment scores (EC). Voisinet et al (1997), working with different bovine genotypes, have found the more incidence of DFD beef cuts in animals with high reactivity scores. There is also difference, in relation to pH1 values, between NA and AA genetic groups (Table 3). Difference in pH1 was also found by Barbosa et al (2000), comparing two bovine groups composing by breed crosses (Nelore x Angus, Nelore x Hereford) and pure european bovines (Aberdeen, Hereford), slaughtered after the same pre-handling conditions. Rough animals have a propense toward a intense stress and if they are slaughtered in these condition can occur decreasing of carcass pH, altering meat characteristics (Fordyce et al., 1988).

CONCLUSION

Bovine temperament and genotype have significant influence on post mortem metabolism. Breed crosses are more reactive and if not carefully handled produce meat with less quality as DFD or PSE defect.

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COUNTRY: BRAZIL

SESSION: LARGE RUMINANT PRODUCTION

MASTITIS MONITORING IN THE SOUTH AREA OF RIO GRANDE DO SUL

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ABSTRACT

The bovine mastitis, under the economical point of view is the most important disease in the milking production systems of the world. The objective of this study was to monitor the mastitis of animals in milking production units (MPU) in South Rio Grande do Sul state, Brazil. Embrapa Clima Temperado developed this project during the period of November 1998 to November 2002. There were visited about 9 MPU monthly. During these visits were used wired cup test and California Mastitis Test (CMT) in all mammary quarters of the milking cows for diagnosis of the mastitis clinical and sub clinical, respectively. The test of CMT was classified according to viscosity of the reaction in: negative, +, ++ and +++. In total 15,002

cows were analyzed. From these, 102 were in the colostrums phase and 85 were in treatment due to a previous mastitis. The remaining 14,815 cows were analyzed, totaling 59,260 mammary quarters. Of these, 716 quarters presented positive reaction to the wired cup test (1.2% of clinical mastite) and 18,319 presented positive reaction to the test CMT (30.9% mastite sub clinical), being 5,044 quarters with +, 7,264 with ++ and 6,011 with +++. There were 484 dry quarters. About 6,612 cows didn't present any positive reaction with relationship to the mentioned tests. These results demonstrate the mastitis occurrence in the MPU, reflecting in the productivity and quality of the milk.

INTRODUCTION

The bovine mastitis, under the economical point of view is the most important disease in the milking production systems of the world. The milking cows live in an environment full of microorganisms and it is inevitable that some of them get in touch with the mammary gland and cause mastitis (Philpot 2002). Over 140 microorganisms were identified as mastitis agents. Considering that eradication is not possible, all effort should be concentrated to keep up theirs level as low as possible. To keep an efficient mastitis control, it is necessary as first priority, to know the actual situation of the herd, the proportion of infected mammary quarters, the inflammation seriousness, and so on. The objective of this study was to follow up the mastitis of animals in milking production Units (MPU) in the South region of Rio Grande do Sul state, Brazil.

METHODS

This project was developed by Embrapa clima Temperado, in South most region of Rio Grande do Sul state, from November 1998 to November 2002. There were evaluated about 9 MPU monthly. The evaluations consisted of wired cup test and California Mastitis Test

(CMT) in all mammary quarters of the milking cows, for diagnosis of mastitis clinical and subclinical, respectively. These tests were done during the milking time of the animals. The test of CMT was done in all mammary quarters and the results were classified according to viscosity of the reaction in a scale from zero to three crosses (o – negative, + low positive reaction, ++ positive reaction, +++ strong positive reaction). From positive mammary quarters (from any these tests) were collected milk samples for further microbiological analysis. Initially cleaning the teat nipple with cotton and alcohol, and then saving a milk sample in a tub did the sample collection. The tubs were put on icebox and sent to the Infectious Disease Laboratory of Veterinary from Federal University of Pelotas for analysis. In addition to the animals evaluation the milking procedure was also evaluated with the objective to improve management quality of the operator. The data statistically analyzed

RESULTS

In a total 15,002 cow were analyzed. From these, 102 were in the colostrums phase and 85 were in treatment due to a previous mastitis. The remaining 14,815 cows were evaluated, in a total of 59,260 mammary quarters, being taken of 484 dry quarters. For mastitis evaluation were considered those 58,776 quarters that were producing milk. Of these, 716 quarters had positive reaction to the wired cup test

(1.2 % of clinical mastitis) and 18,319 with positive reaction to the test CMT (30.9 % mastitis sub clinical). The clinical mastitis is easily identified and it is very familiar to those who work with milking cows, being the sub clinical mastitis much more important, since it is not easily identified, but it cause losses in production of milk (Philpot, 2002).

The seriousness of sub clinical mastitis was evaluated according to the intensity of CMT reaction: + (5,044 quarters or 27.53%), ++ (7,264 quarters or 39.66%) and +++ (6,011 quarters or 32.81%). According to Neiva (2000), the reduction of milk production is highly correlated with the level of infection, and it can cause losses up to 50% on those quarters with sub clinical mastitis. About 6,612 cows didn't present any positive reaction to the mentioned tests. Only these animals were producing milk at the expected quantities without any losses in milk quality.

CONCLUSION

There is occurrence of mastitis in the MPU, reflecting in the productivity and quality of milk.

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COUNTRY: BRAZIL

SESSION: LARGE RUMINANT PRODUCTION

STAPHYLOCOCCUS AUREUS CHARACTERIZATION BASED ON CMT REACTION

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ABSTRACT

The Staphylococcus aureus is a mastitis agent of difficult treatment due to the development of fibrous tissue that inhibits the antibiotic action. Almost all the infections are sub clinics, chronic, with high count of somatic cells (CSC). The objective of this study was to identify the occurrence of Staphylococcus aureus in milking production units (MPU) in South Rio Grande do Sul State and to characterize its relationship to the reaction of California Mastitis Test (CMT). Embrapa Clima Temperado, from November 1998 to November 2002, developed this project. There were visited about 9 MPU monthly. The relationship between clinical and sub clinical mastitis of milking cows were analyzed in all mammary quarters through the wired cup test and CMT. Samples for microbiological identification were collected from all positive quarters. In the total 58,776 mammary

quarters were analyzed (being excluded the dry quarters), 716 were positive for clinical mastitis and 18,319 positive for sub clinical. After microbiological analysis 11,296 samples presented microbiological growth, and in 1,117 the *S. aureus* was isolated. From these 73 (6.53%) had clinical mastitis, 213 (19.07%) were CMT+, 381 (34.11%) CMT++ and 450 (40.29%) CMT+++. In spite of most samples indicate high SCC; the results of CMT+ can be preoccupying because they pass unnoticed to the farmer, causing the agent's dissemination in the herds.

INTRODUCTION

Staphylococcus aureus is a gram-positive microorganism, generally found in the teat channel, in the mammary gland or over the teat skin whenever it has any injure. The transmitting is done through as operator hands, multiple use clothes (Fonseca & Santos, 2000). This bacteria cause harm to the secretor tissue, by toxicity. According to Philpot & Nicherson (2002) when these bacteria reach the gland tissue there is an abscess formation and encapsulation for fibrous tissue. This is a mechanism of defense of the organism to isolate the bacteria and to maintain localized, however, it inhibit the antibiotic action. These abscess and fibrous tissues will substitute the secretor tissue, diminishing the area of milk production. Almost all infection are sub clinical, chronicle and with high level of somatic cells. In some case it can cause death to the infected animal. Because that *Staphylococcus aureus* in one of the most trouble agent in the actual dairy cattle activity, cooling the infected cows is a recommendation to avoid dissemination throughout the herd. The objective of this study was to identify the occurrence of *Staphylococcus aureus* in milking production units (MPU) in South Rio Grande do Sul State and to characterize its relationship to the reaction of California Mastitis Test (CMT).

METHODS

This project was developed by Embrapa Clima Temperado, South most Region of Rio Grande do Sul State, from November 1998 to November 2002. There were visited about 9 MPU, monthly, localized in Pelotas, São Lourenço, Capão do Leão (2 MPU), Retiro, Cerrito, Arroio Grande, Santa Vitória do Palmar and Taim cities. All lactating cows were analyzed to the occurrence of clinical and sub clinical mastitis during milking, trough wired cup test and California Mastitis Test (CMT), respectively. The CMT test is easily done at field level and showed high correlation with the somatic cells count. This test was done on all mammary quarters being the results classified in a scale from zero to three crosses according to the viscosity of the reaction (0 negative reaction, + weakly positive reaction, ++ positive reaction, strongly positive reaction). From thes mammary quarters that had a positive reaction to the wired cup or CMT tests milk sample was collected for microbiological analysis. These samples collection was done by initially cleaning the teat nipple with cotton and alcohol, and then saving a milk sample in a tub. The tubs were put on icebox and sent to the Infectious Disease Laboratory of Veterinary form Federal University of Pelotas for analysis. In addition to the animals evaluation the milking procedure was also evaluated with the objective to improve management quality of the operator. The data were statistically analyzed.

RESULTS

During the study period 58,776 mammary quarters where analyzed (being excluded

484 dry quarters). The sub clinical mastitis was 31.17% (18,319 quarters) and the clinical mastitis was 1.22 % (716 quarters). According to Fonseca & Santos (2000) for an efficient mastitis control it is necessary to reach levels below 1% for clinical mastitis. On the microbiological analysis, 11,296 samples had microbiological positive growth with isolation of some microbe agent. From 1,117 samples the Staphylococcus aureus (9.89 % agent) was isolated. There were found positive samples of S. aureus on all MPU studied. The data bring concern because the high irreversible damage caused by this agent. Related to the characterization of this agent to wired cup and CMT tests the following results were found: 73 quarters (6,53%) had clinical mastitis (wired cup positive), 213 quarters (19.07%) reaction to CMT +, 381 (34.11%) CMT ++, and 450 (40.29%) CMT +++. The results are in agreement with those from Philpot & Nickerson (2002), which indicated that most infections are sub clinical and with high somatic cells count. Nevertheless the weakly sub clinical reaction (19.07%) may be serious, because, frequently this situation can be overlooked by the operator or by the owner. This fact can prevent the positive animal isolation, being a hazardous to the agent dissemination to the herd.

CONCLUSION

Staphylococcus aureus is present in all dairy cattle herd studied in the South most Region of Rio Grande do Sul State, and the majority of the samples were related to a sub clinical mastitis with high CMT.

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COUNTRY: BRAZIL

SESSION: LARGE RUMINANT PRODUCTION

CORYNEBACTERIUM BOVIS AS BOVINE MASTITIS AGENT

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ABSTRACT

The Corynebacterium bovis is one of the most prevalent agents in milking production systems at different countries. It is believed that the main sources of infection are the infected udders and the channel of the teat, and that the

contamination is cow to cow. The objective of this study was to identify the occurrence of *Corynebacterium bovis* as clinical and sub clinical mastitis agent of lactating cows in milking production units (MPU) in South Rio Grande do Sul State and its variation throughout three years. This project was developed by Embrapa Clima Temperado, from January 2000 to August 2002. There were visited about 9 MPU monthly. During the visits wired cup test and California Mastitis Test (CMT) were used in all mammary quarters of lactating cows for diagnosis of mastitis clinical and subclinical, respectively. From positive quarters samples were collected for microbiological identification. In the total 41,697 mammary quarters were evaluated (already excluded the dry quarters) and 14,146 samples were analyzed microbiologically. From these 5,165 didn't present microbiological growth and 8,981 were isolated some microbial agent. From isolated agents, 5,061 (56.35%) samples presented *Corynebacterium bovis*, being 100 quarters with clinical mastitis and 4,961 with mastitis sub clinical. The occurrence of *C. bovis* was of 60.27%, 56.21% and 48.57% for years 2000, 2001 and 2002 respectively. These results demonstrate the high occurrence of this agent, especially subclinical mastitis, possibly due to lack of hygiene during milking.

INTRODUCTION

The *Corynebacterium bovis* is one of the most prevalent agents in milking production systems at different countries. It is characterized for being a very contagious agent. This bacterium is resistant to the pasteurization process and it is classified as psicrotrophic bacterium. It is believed that the main source of infection is the infected udders and the channel of the teat and the contamination is cow to cow at the milking time. The *Corynebacterium bovis* occurs on herds where there is no practice of teats disinfections after milking and dry cows are not treated (Philpot & Nickerson, 2002). The teats immersion after milking is used diminish the microorganisms population which remain on the teat skin after extraction the milking apparatus, reducing the number of bacteria over the skin and avoiding the bacteria penetration in the teat channel (Ruegg, 2001). The objective of this study was to identify the occurrence of *C. bovis* as clinical and subclinical mastitis agent of lactation cows in milking production units (MPU), in South Rio Grande do Sul State and its variation throughout three years.

METHODS

Embrapa Clima Temperado developed this project in the South region of Rio Grande do Sul, from January 2000 to August 2002. There were visited about 9 MPU monthly, in the following cities, Pelotas, São Lourenço, Capão do Leão (two MPU), Retiro, Cerrito, Arroio Grande Santa Vitória do Palmar and Taim. All lactating cows were analyzed for occurrence of clinical and subclinical mastitis during milking time, through wind cup test and California Mastitis Test (CMT), respectively. The CMT was performed on all mammary quarters being the result classified in a scale from zero to three crosses according to the viscosity of the reaction (0 – negative reaction, + weakly positive reaction, ++ positive reaction, +++ strongly positive reaction). From these mammary quarters that had a positive reaction to the wired cup or CMT tests milk sample was collected for microbiological analysis. These samples collection was done by initially cleaning the teat nipple with cotton and alcohol, and then saving a milk sample in a tub. The tubs were put on icebox and

sent to the Infectious Disease Laboratory of Federal University of Pelotas for analysis. In addition to the animals evaluation the milking procedure was also evaluated with the objective to improve management quality of the operator. The data were statistically analyzed.

RESULTS

During the experimental period 247 visits were accomplished to the different MPU. There were evaluated 41,697 mammary quarters (being excluded 355 dry quarters) and 14,116 milk samples were sent to microbiological analysis. From those mammary quarters sent to microbiological analysis 8,733 (61.74%) were identified some type of etiological agent, 248 samples (1.75%) had developed two types of agent and 5,165 (36,51%) there were no agent growth. The lack of bacteria growth in a large number of samples may be caused by non infection mastitis, or any inflammatory process which agent had being eliminated by immune system, or any failure in the detection of the agent in the sample, since some agents are eliminated through the milk in a constant way (Philpot & Nickerson 2002).

From samples that were positive to microbiological analysis, 5,061 (56.35%) had *C. bovis*. This result is different from those from Ruegg (2001), where *C. bovis* make up only 2% of found agent. The high prevalence of this contagious agent could be related to deficient milking management on the majority of MPU. Most properties used the teat immersion in disinfecting solution after milking (only one didn't use), but many times the solution dilution was below the recommended, or the equipment was contaminated. Relation to intensity of mastitis caused by *C. bovis*, 1,050 samples were subclinical mastitis with weakly reaction (+), 1,950 medium reaction (++), 1,961 strongly reaction (+++) and 100 samples had clinical mastitis (figure 1).

According to Philpot & Nickerson (2002) samples with weakly reaction to CMT (trace), had about 300,000 somatic cells/mL milk, and reactions of +, ++ and +++ had, respectively, 900, 2,700 and 8,100 thousand cell/mL. In this way, a large part of samples where was identified *C. bovis* had CMT reactions that are related to a somatic cell count over 900,000 cell/mL (reaction with one or more crosses). This result is in disagreement from other authors, like Fonseca & Santos (2000), which consider this agent as secondary pathogen, because present a limited virulence, according to them, determining a small increase in the somatic cell count (300 to 400 thousand cell/mL) being most cases subclinical and weak. However, seems that losses caused by this agent probably are higher them those citations.

The occurrence of *C. bovis* in relation to total identified agents in the years 2000, 2001 and 2002 was respectively, 58.39%, 54.69% and 47.38%. These data showed a reduction of contamination caused by this agent during the work, and it can be a demonstration of management improvement.

CONCLUSION

There was a high occurrence of *C. bovis* as etiologic agent of clinical and subclinical mastitis in this region during the three years study. The result suggests further studies about this agent.

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COUNTRY: BRAZIL

SESSION: GRASSLAND AND FORAGE CROPS

EFFECTS OF FORAGE ALLOWANCE IN TANZÂNIA GRASS (*Panicum maximum* Jacq. Cv Tanzânia - 1) ON PASTURE DYNAMICS¹

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ABSTRACT

A grazing experiment was conducted at the Cidade Gaúcha, Brazil, to describe sward characteristics responses relationships of steers continuous stocking on a *Panicum maximum* Jacq. Cv. Tanzânia I. Four levels of forage allowance (FA) were evaluated: 3.0, 7.0, 11.0 and 15.0 Kg of green leaves lamina dry matter (GLLDM)/100 Kg BW/day from March-August 2000. The total DM and dead material residues had positive linear response in FA's. The stems + sheath and others species residues had curvilinear response in FA's function, with increases up to 15% of FA, together with the pasture height and the growth green leaf lamina rate. In the other hand the green leaf lamina residue and the soil had curvilinear response in FA's function stabilizing around 11% of FA. The FA of 11% seems to be the best results for pasture dynamics.

KEYWORDS

Continuous stocking.

INTRODUCTION

Livestock production in Brazil is a forage based system. Animal production is characterized by a large fluctuation during the year, having low productivity indices. The animal production is dependent on quantity and quality of consumed forage, and grazing affects the productivity of pasture. The Knowledge about management systems that optimized the utilization of these as well as the basic relationships that explain the productivity of these systems is small. Thus, the aim this work is about

forage allowance effects in the pasture dynamics of Tanzânia grass (*Panicum maximum* Jacq. Cv. Tanzânia - 1), in continuous stocking.

MATERIALS AND METHODS

A grazing experiment was conducted on a Tanzânia grass (*Panicum maximum* Jacq. Cv. Tanzânia - 1) pastures at the Fazenda 46, Cidade Gaúcha, Brazil, to describe the sward characteristics. Four levels of FA were evaluated: 3.0; 7.0; 11.0; and 15.0 Kg of green leaves lamina dry matter (GLLDM)/100 Kg of body weight (BW)/day from March-August 2000. FA was adjusted by Put & Take technique, using 2 yearling steers as fixed animals, in a continuous stocking system. Herbage mass (DM/ha) was measured by Haydock & Shaw's (1975) technique, with 5 cut sample and 20 visuals sample by paddock. Pasture height (cm) was measured in all sample. After cut, the forage was taken to the laboratory where the green leaves, stems + sheath, senescent material and others species separation was made, to obtain the separated weight. Samples were dried in circulation forced air stove at 80°C for 48 hours to MS's determination. Dates were analysed by regressions and by analysis of variance.

RESULTS AND DISCUSSION

The total DM residue (DMR) and dead material (DMDMR) residues had positive linear response in FA's function (1,959.48; 3,164.42; 4,369.36; and 5,574.30 kg/ha of DM and 245.13; 835.20; 1,521.22; and 2,303.19 kg/ha of DM, respectively). The stems + sheath (DMSSR) and others species (DMOSR) residues had curvilinear response in FA's function, with increases up to 15% of FA, together with the pasture height (H) and the green leaf lamina growth rate (GLLGR) (23.78; 42.35; 56.07; and 64.96 cm and 34.07; 50.73; 62.89 and 70.54 kg/ha of DM green leaf lamina/day, respectively). In the other hand the green leaf lamina residue (DMGLR) and the soil cover (SC) (973.42; 1,331.18; 1,528.62; and 1,565.73 kg/ha of DM and 89.64; 94.89; 97.84 and 98.48 %, respectively) had curvilinear response in FA's function stabilizing around 11% of FA.

The results to DMR show how can be imperfect the estimates for the pastures stocking density adjustment when they take for base this variable (Figure 1). DMR of 1,958.48 DM kg/ha would be more than enough to provide elevated performances in bovine under grazing (Moore, 1980), however this value should be more applied to tempered grasses. In other hand, in tropical grasses when take DMGLR more suitable value with that actually the animal search in grazing can be observed. In FA of 3% DMGLR is equivalent to 973.42 DM kg/ha contributing with 48.2% of DM available total (Figure 1), while in FA of 11% was 1,528.62 DM kg/ha, although contributed about 34% of total DM. It knows, in tropical grasses specially, that bovine in grazing prefer leaves then stems and dead materials (Carvalho, 1997). DMSSR increased in function of FA, as expect, because as lets larger available forage quantity for the animal starts to remain forage, resulting in higher pasture and great amount of dead material (Figures 1, 2 and 3).

The dead material accumulation is consequence of several factors, one would be the light quantity and quality decrease that crosses sward. In FA of 3% larger light quantity reaches the plant base while in the larger FA occurs the inverse, in consequence of larger leaves plants and higher plants.

When in the smallest FA larger quantity of others species composed the pasture

(*Brachiaria brizantha*, *B. decumbens*, *B. humidicola* and *Paspalum notatum*, beyond others species without potential of grazing), but as elevated FA gradually Tanzânia grass became the dominant species. These results are due to both, larger pasture height of Tanzânia grass in the larger FA, which would shade the others species, and the high intensity of grazing in the smallest FA. This results shows that very low FA in pastures of Tanzânia grass can conducted them the degradation of plants. At the end of the evaluation period (August) one of the three pickets that composed FA's treatment of 3% presented plants degradation signals. The FA of 11% seems to be the best results for pasture dynamics.

CONCLUSION

Without the fertilizers addition in pasture of Tanzânia grass the more suitable forage allowance for the association between live weight gain and gain per hectare and dynamic of the pasture it finds in the around of 7-11% of forage allowance.

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COUNTRY: BRAZIL

SESSION: ANIMAL GROWTH AND DEVELOPMENT

EFFICIENCY OF NON-LINEAR MODELS FOR ESTIMATION OF GROWTH CURVE PARAMETERS OF HOLSTEIN-FRIESIAN FEMALES

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ABSTRACT

Estimates of growth curve parameters are important for decision-making in breeding and management programs of dairy cattle. In Brazil little is known about the relative efficiency of non-linear models for estimating growth curve parameters of Holstein-Friesian females, especially for weights at ages older than 24 months. The objective of this study was to compare the relative efficiency of five non-linear models, namely von Bertalanffy, Brody, Gompertz, Logistic and Richards, for estimating weight at maturity (A) and maturing rate (k) of 323 Holstein-Friesian

females born from 1993 to 2000 and raised on an intensive dairy cattle production system at Embrapa - Southeast Cattle Center, São Carlos, São Paulo state, Brazil. The data (N = 7,836 body weight records obtained from birth up to ages older than 24 months) were analyzed utilizing the Gauss-Newton iterative method through the Non-Linear Regression (NLIN) procedure of the Statistical Analysis System (SAS) package. The relative efficiency of each non-linear model for estimating weight at maturity and maturing rate was measured as a multiplicative index of the following criteria: convergence percentage, determination coefficient, quality of adjustment and residual mean square. The classification of the models according to the relative efficiency index was: 1) von Bertalanffy = 77.35%; 2) Brody = 33.32%; 3) Logistic = 15.30%; 4) Gompertz = 9.24%; and 5) Richards = 0% (convergence criterion not met). Therefore, the von Bertalanffy non-linear model should be the model of choice for obtaining estimates of weight at maturity and maturing rate in Holstein-Friesian females.

KEYWORDS

Dairy cattle, mature weight, maturing rate.

INTRODUCTION

Estimates of growth curve parameters are important for decision-making in breeding and management programs of dairy cattle. In Brazil little is known about the relative efficiency of non-linear models for estimating growth curve parameters of Holstein-Friesian females, especially for weights measured at ages older than 24 months. The simplest definition of growth was formulated by Seebeck (1968) in which growth is seen as the change in the animal size according to time. Parks (1982) added that the change in size could also be on liveweight or mass according to time or other variable, as an empirical description of growth independent of any theory. Growth curve parameters (especially weight at maturity and maturing rate) are used to describe the process. There are a few studies in Brazil with the objective of studying non-linear models for estimation of the growth curve parameters of dairy cattle (Kroll, 1990; Freitas et al., 1997; Perotto et al., 1997a,b; McMannus et al., 1998; Bergamasco et al., 2001). However, in most cases only liveweights up to 24 months of age have been used to estimate growth curve parameters. Also there is no consensus about the most efficient model, mainly because the correlation among the estimates have been found to be low. The objective of this study was to compare the relative efficiency of five non-linear models (von Bertalanffy, Brody, Gompertz, Logistic and Richards) for estimating weight at maturity (A) and maturing rate (k) of Holstein-Friesian females utilizing records from birth to ages older than 24 months.

MATERIALS AND METHODS

Liveweight data analyzed in this study were recorded monthly from birth up to time of disposal (death or sale) on Holstein-Friesian females born from 1993 to 2000 in the intensive dairy cattle production system at Embrapa - Southeast Cattle Center, São Carlos, SP, Brazil. In the intensive dairy cattle production system, during the rainy season (October-March) the females are raised on pastures of *Panicum maximum* cv. Tanzânia and *Tobiatã* and *Pennisetum purpureum* cv. Elefante, with rotational grazing, and supplemented with concentrates according to age and stage

of production. During the dry season (April-September) females are supplemented with corn silage or sugarcane corrected with urea and concentrates. The data (N = 7,836 body weight records obtained from birth up to ages older than 24 months) were analyzed utilizing the Gauss-Newton iterative method through the Non-Linear Regression (NLIN) procedure of the Statistical Analysis System (SAS, 1995) in order to obtain the estimates of weight at maturity (A) and maturing rate (k) utilizing five non-linear models (Bertalanffy, Brody, Gompertz, Logistic and Richards). Non-linear model equations are given in Table 1. The relative efficiency of each non-linear model for estimating weight at maturity and maturing rate was measured as a multiplicative relative (%) index of the following criteria: convergence percentage, coefficient of determination, quality of mature weight adjustment (percentage of estimates between two standard deviations from the average observed liveweight of mature cows) and residual mean square.

RESULTS AND DISCUSSION

Means for mature weight, maturing rate, convergence percentage, coefficient of determination, quality of adjustment and residual mean square are shown in Table 2. Means for mature weight and maturing rate were estimated only for those females where the convergence criterion was met by the non-linear model. With respect to the convergence criterion the non-linear models ranked as follows: Bertalanffy, Brody, Logistic, Gompertz and Richards. The computational easiness of the Bertalanffy model proportionate an excellent convergence (100%) and quickness of the iterative process (average of 5.04 iterations ranging from 2 to 10). These results are similar to those reported in Brazil by Duarte (1975), Carrijo (1988), Silva (1998) e Silva et al. (2000) with iteration averages varying from 8 to 9. Although with good convergence percentage, the Brody's model had a higher average number of iterations (19.33) and estimated mature weight with values outside the parametric space; similar results were found by Bergamasco et al. (2001). Both the Logistic and the Gompertz models presented low number of iteration averages (3.08 and 2.87 respectively), but were very poor in terms of convergence percentage. Bergamasco et al. (2001), in contrast to the results obtained in this study, reported higher convergence percentage of the Gompertz model. The estimates of mature weight obtained with the Gompertz and the Logistic models (Table 2) were similar to those reported for Holstein-Friesian females in Brazil by Freitas et al. (1997), McManus et al. (1998) and Bergamasco et al. (2001). The Richards model, with the parametrization adopted in this study, presented a very high computational difficulty which resulted in a null convergence, as has been reported by Oliveira et al. (2000) and Tedeschi et al. (2000) in beef cattle. Perotto et al. (1997a), however, recommended the Richards model for estimating growth curve parameters of crossbred Holstein x Zebu females. For all models in which the convergence criterion was met the coefficient of determination was higher than 99%, result even better than that reported by Freitas et al. (2000). The best quality of mature weight estimates, when the convergence criterion was met, was obtained for the Gompertz and Logistic models (100%), followed by the Bertalanffy and Brody models (Table 2). According to the multiplicative relative index the non-linear models were classified in the following order: 1) Bertalanffy = 77.35%; 2) Brody = 33.32%; 3) Logistic = 15.30%; 4) Gompertz = 9.24%; and 5) Richards = 0.00%.

CONCLUSIONS

From the five non-linear models evaluated in this study, four of them met the convergence criterion for at least 10% of the 323 Holstein-Friesian females. The efficiency of the non-linear models for estimating the growth curve parameters (mature weight and maturing rate) according to the multiplicative relative index was as follows: 1) Bertalanffy = 77.35%; 2) Brody = 33.32%; 3) Logistic = 15.30%; 4) Gompertz = 9.24%; and 5) Richards = 0.00%. Therefore, the Bertalanffy model should be utilized to obtain estimates of the growth curve parameters of Holstein-Friesian females.

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COUNTRY: BRAZIL

SESSION: ANIMAL GROWTH AND DEVELOPMENT

CROSSBREEDING BEEF CATTLE IN BRAZIL: EFFECTS OF GENETIC GROUP ON AGE AT SLAUGHTER, CARCASS WEIGHT AND FAT THICKNESS

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ABSTRACT

With the objective of evaluating the effects of genetic group on age at slaughter (AS), carcass weight (CW) and fat thickness (FT), published experimental results obtained in Brazil were analyzed using the Generalized Linear Models procedure of the SAS (1995) package through a model with the fixed effects of genetic group, sex, finishing system, decade and, for CW and FT, linear and quadratic effects of AS within finishing system. There were significant effects of genetic group on all traits analyzed. The genetic groups were classified according to a relative index (%) of $1/3AS + 1/3CW + 1/3FT$. As compared to Zebu cattle (particularly the Nelore

breed), the British breeds have higher potential for improving carcass traits than the Adapted and Continental breeds used in crossbreeding systems in Brazil.

KEYWORDS

Bos indicus, *Bos taurus*, *Bos taurus* x *Bos indicus* crosses.

INTRODUCTION

Among the breeding strategies available to beef cattle producers in Brazil, crossbreeding has been found to be important for improving carcass traits, especially carcass weight (Barbosa & Duarte, 1989). However, little is known about age at slaughter and fat thickness which, together with carcass weight, could be combined in a relative index to evaluate the overall efficiency of crossbreeding, as compared to the most utilized genetic resource for beef production in Brazil, the Zebu breeds with special reference to Nelore. The potential of the adapted (naturalized) breeds for utilization in crossbreeding systems was reported by Barbosa et al. (2000). In addition, to meet the specifications of the Brazilian beef markets it is necessary to have different types of cattle and finishing systems. Knowledge about this subject is important for decision-making in breeding and management programs. The objective of this study was to evaluate the effects of genetic group on age at slaughter, carcass weight and fat thickness of beef cattle finished on different systems of production adjusted for other factors that influence those traits.

MATERIALS AND METHODS

Experimental results published in Brazil from 1940 to 2002 on age at slaughter (AS; n = 1,138), carcass weight (CW; n = 1,115) and fat thickness (FT; n = 759), comparing at least two genetic groups on the same finishing system, were compiled and analyzed by the least-square means method utilizing the General Linear Models procedure of the Statistical Analysis System (SAS, 1995). The mathematical model included the effects of genetic group (A = Adapted breeds; B = British breeds; C = Continental breeds; Z = Zebu breeds; AX = F1 A x Z; BZ = F1 B x Z; CZ = F1 C x Z; BC = backcrosses to either A, B, C or Z breeds; and TC = three-way crosses), sex (intact males and steers), finishing system (feedlot and pastures), decade (1960, 1970, 1980 and 1990), region (Central-West, South and Southeast) and, for CW and FT, the linear and quadratic effects of AS within finishing system. In order to evaluate the efficiency of the different crossbreeding systems, the least-square means were expressed as percentages (Z = 100%) and the genetic groups were classified according to a multiplicative relative index (%) calculated as $1/3AS \times 1/3CW \times 1/3FT$, assuming that the three traits have equal economic importance on the classification of the carcass.

RESULTS AND DISCUSSION

Analyses of variance. Analyses of variance are summarized in Tables 1 (age at slaughter), 2 (carcass weight) and 3 (fat thickness). There were significant effects of genetic group for all traits analyzed. For age at slaughter the most important source of variation was genetic group followed by sex and finishing system, while decade and region had similar effects (Table 1). Carcass weight was mostly influenced by genetic group, decade and the linear effect of age; finishing system

did not influence carcass weight (Table 2). The most important source of variation for fat thickness was genetic group, followed by sex and region (Table 3).

Comparable results were not found in the literature reviewed; therefore, there is no scope for comparing the results obtained in this study. Therefore, considering the three traits analyzed in this study, it can be concluded that genetic group was the most important source of variation influencing them.

Least-square means. Least-square means (standard error) for the traits analyzed according to the genetic groups are showed in Table 4. For age at slaughter, the F1 Adapted x Zebu crossbreeds had the highest least-square mean (34.9 months) and differed significantly from all other genetic groups, except the adapted breeds and the backcrosses to adapted breeds. This was expected since the adapted breeds have been selected in Brazil mainly for adaptation to harsh environments where both quantity and quality of forages are limiting factors to livestock production. For age at slaughter there were significant differences between the Zebu (31.2 mo.) and each of the other genetic groups, except the adapted breeds (31.9 mo.) and the backcrosses to adapted breeds (33.1 mo.). Zebu cattle were superior to the F1 Adapted x Zebu crossbreeds (34.9 mo.). The best performance for age at slaughter was for the genetic groups including British breeds (average of 24.7 mo.), followed by three-way crosses (27.7 mo.) and those with Continental breeds (28.3 mo.).

There were observed significant differences for carcass weight between the Zebu and each of the other genetic groups, with two exceptions: the British breeds and the backcrosses to British breeds. The genetic groups including Adapted breeds had the highest carcass weight average (256.7 kg), followed by the F1 British x Zebu, Zebu backcrosses and three-way crosses (245.7), those with Continental breeds (236.3), and the British, their backcrosses and Zebu (226.4 kg). These results are in accordance with the relative differences estimated by Barbosa & Duarte (1989). As far as fat thickness is concerned, there were significant differences among genetic groups; on average, their ranking was as follows: Zebu breeds, British breeds, British backcrosses and Adapted breeds (4.27 mm), F1 British x Zebu, F1 Continental x Zebu, Zebu backcrosses and three-way crosses (3.24 mm), and Continental breeds and their backcrosses, F1 Adapted x Zebu and Adapted backcrosses (2.31 mm). The performance of Zebu cattle for fat thickness (4.76 ± 0.22 mm) is more closely related to market specifications than the other genetic groups (except Adapted and British breeds and British backcrosses).

Multiplicative relative indices. The classification of the 12 genetic groups according to the multiplicative relative index ($1/3AS + 1/3CW + 1/3FT$) is shown in Table 5. The British backcrosses, the British breeds and the F1 British x Zebu were the only genetic groups superior to Zebu. This result show that the British breeds have higher potential for improving carcass traits than the Adapted and Continental breeds used in crossbreeding systems in Brazil. Similar results were reported by Barbosa (2000). As compared to Zebu cattle, on average the crossbreeds were superior for age at slaughter (10%) and carcass weight (7%), but had a very poor performance for fat thickness (36% lower), resulting in a total performance disadvantage of 25%. The same conclusion can be stated for the average performance of the Adapted, British and Continental purebreds (19% disadvantage). These results demonstrate that different finishing systems need to be fitted for different types of cattle if market specifications are to be met by the majority of the beef cattle production systems in Brazil.

CONCLUSIONS

Genetic group is the most important source of variation influencing age at slaughter, carcass weight and fat thickness when data are adjusted for other sources of variation (sex, finishing system, decade, region and age at slaughter where appropriate). The performance of Zebu cattle for fat thickness is more closely related to market specifications than the other genetic groups (except Adapted and British breeds and British backcrosses). The British backcrosses, the British breeds and the F1 British x Zebu were superior to Zebu, showing that the British breeds have higher potential for improving age at slaughter and carcass traits than the Adapted and Continental breeds. As compared to Zebu cattle, on average the crossbreds were superior for age at slaughter (10%) and carcass weight (7%), but had a very poor performance for fat thickness (36% lower), resulting in a total performance disadvantage of 25%. The average performance of purebreds (Adapted, British and Continental breeds) was 19% lower than that of Zebu. These results demonstrate that different finishing systems need to be fitted for different types of cattle if market specifications for carcass weight and fat thickness are to be met by the majority of the beef cattle production systems in Brazil.

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COUNTRY: BRAZIL

SESSION: ANIMAL GROWTH AND DEVELOPMENT

RELATIONSHIPS AMONG GROWTH CURVE PARAMETERS AND MILK YIELD PER DAY OF CALVING INTERVAL IN HOLSTEIN-FRIESIAN FEMALES

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ABSTRACT

Estimates of growth curve parameters are important for decision-making in breeding and management programs of dairy cattle. In Brazil little is known about the relationships among the growth curve parameters and efficiency of production in dairy cattle, especially for measures such as milk yield per day of calving interval. The objective of this study was to evaluate the relationships of weight at maturity (A) and maturing rate (k) with milk yield per day of calving interval of 629 lactation records of 323 Holstein-Friesian cows raised on an intensive dairy cattle production system at Embrapa - Southeast Cattle Center, São Carlos, São Paulo state, Brazil. The Bertalanffy non-linear growth model was utilized for obtaining the estimates of A and k through the iterative method of Gauss-Newton, utilizing the Non Linear Model (NLIN) procedure of the Statistical Analysis System (SAS, 1995). Data were analyzed utilizing the General Linear Models (GLM) procedure of SAS, through a mathematical model including the fixed effects of year and season of birth, genetic group, calving order and type, drying-off reason and the linear and quadratic effects of lactation length, weight at maturity and maturing rate. There was a significant correlation coefficient between A and k (-0.59), indicating that faster maturing cows are lighter at maturity. There were observed significant effects of year and season of birth, calving order, calving type, drying-off reason and linear and quadratic effects of both lactation length and maturing rate on milk yield per day of calving interval. There was observed a significant correlation coefficient between maturing rate and milk yield per day of calving interval (0.15). The regression equation of maturing rate on milk yield per day of calving interval ($MY/CI = -15.36 + 140.12k - 614.05k^2$) indicated that the optimum maturing rate of Holstein-Friesian cows that maximizes milk yield per day of calving interval would be equal to 0.1141 kg/kg of liveweight/month at a mature weight of 670 kg.

KEYWORDS

Dairy cattle, mature weight, maturing rate, productive efficiency.

INTRODUCTION

Estimates of growth curve parameters are important for decision-making in breeding and management programs of dairy cattle. In Brazil little is known about the relationships among growth curve parameters (A = mature weight and k = maturing rate) and productive efficiency of dairy cattle, especially when A and k are estimated utilizing liveweight records measured at ages older than 24 months. Growth curve parameters of dairy cattle breeds and crossbreds (1/2 and 3/4) *Bos taurus* x *Bos indicus* have been estimated by Kroll (1990), Freitas et al. (1997), Perotto et al. (1997a,b), McManus et al. (1998) and Bergamasco et al. (2001). Liveweight, height and liveweight/height ratio of crossbred Holstein x Guzerá (1/4 to 7/8) and graded Holstein heifers and cows were reported by Madureira et al. (2002). Relationships among growth curve parameters, weight and reproductive traits in Guzerá beef cows were reported by Oliveira et al. (1994). However, results on the relationships among growth curve parameters and measures of productive efficiency, such as milk yield per day of calving interval, are scarce in the literature.

The objective of this study was to evaluate the relationships among weight at maturity (A) and maturing rate (k) and milk yield per day of calving interval (MY/CI) of Holstein-Friesian cows raised on a tropical forages based intensive dairy cattle production system.

MATERIALS AND METHODS

Liveweight data analyzed in this study were recorded monthly from birth up to time of disposal (death or sale) on 323 Holstein-Friesian females born from 1980 to 2000 in the intensive dairy cattle production system at Embrapa - Southeast Cattle Center, São Carlos, SP, Brazil. Lactation milk yield and calving interval (n = 629) were recorded in order to calculate the milk yield per day of calving interval. In the intensive dairy cattle production system, during the rainy season (October-March) the females are raised on pastures of *Panicum maximum* cv. Tanzânia and *Tobiatã* and *Pennisetum purpureum* cv. Elefante, with rotational grazing, and supplemented with concentrates according to age and stage of production. During the dry season (April-September) the females are supplemented with corn silage or sugarcane corrected with urea and concentrates. Liveweight records obtained from birth up to ages older than 24 months were analyzed utilizing the Gauss-Newton iterative method through the Non-Linear Regression (NLIN) procedure of the Statistical Analysis System (SAS, 1995) in order to obtain the estimates of mature weight (A) and maturing rate (k) utilizing the non-linear model of Bertalanffy (1957). Milk yield per day of calving interval data were analyzed by least-squares method utilizing the General Linear Models (GLM) procedure (SAS, 1995). The model used to analyze the data included the fixed effects of year of birth (1980, 1982, 1985, 1987-2000), season of birth (summer = January-March; fall = April-June; winter = July-September; spring = October-December), genetic group (5/8 to 15/16 Holstein-Friesian; graded Holstein; first, second, third and four generations of graded Holstein; and purebred Holstein), calving order (1 to 5), calving type (normal, distocia, abortion), drying-off reason (pre-calving, low production, other reasons) and the linear and quadratic effects of lactation length, mature weight and maturing rate.

RESULTS AND DISCUSSION

Means, standard deviations, minimum and maximum for some of the traits analyzed in this study are presented in Table 1. Mature weight and maturing rate means were higher than those reported by Perotto et al. (1997a) for Zebu (Gyr and Guzerá) and crossbred Holstein x Friesian (F1 and 3/4 Holstein) dairy cows using the Richards model. A summary of the analysis of variance of milk yield per day of calving interval is shown in Table 2. There were observed significant effects of year of birth, season of birth, calving order, calving type, drying-off reason and linear and quadratic effects of both lactation length and maturing rate on milk yield per day of calving interval. The most important factors affecting MY/CI were calving order, drying-off reason and the linear effect of lactation length. To illustrate the magnitude of variation of MY/CI the least-squares means for calving order and drying-off reason are given in Table 3, where it can be observed that first- and second-calving cows produced respectively 69.39% and 82.11% of the average (19.96 kg/day) of third-, fourth- and fifth-calving cows. Cows which lactation was terminated because of the proximity (up to 75 days) of the next calving were 18.70% more efficient than those

with lactations terminated by low production and other reasons. There was a highly significant correlation coefficient between A and k (-0.59), indicating that faster maturing cows are lighter at maturity and suggesting the existence of a biological antagonism between them. Results obtained by Perotto et al. (1997a) suggested that the shape of the growth curve can be altered through crossbreeding. There was observed a positive and significant correlation coefficient between maturing rate and milk yield per day of calving interval (0.15), indicating that faster maturing are more efficient than later maturing cows. It should be emphasized that the significant ($P < 0.01$) linear and quadratic effects of maturing rate on milk yield per day of calving interval are adjusted for the other factors included in the mathematical model. The regression equation of maturing rate on milk yield per day of calving interval ($MY/CI = -15.36 + 140.12k - 614.05k^2$), adjusted for other factors influencing milk production, indicated that the optimum maturing rate of Holstein-Friesian cows that maximizes milk yield per day of calving interval would be equal to 0.1141 kg/kg of liveweight/month at a mature weight of 670 kg (standard deviation of 94 kg). Average maturing rate was 0.0756 kg/kg of liveweight/month and it is necessary to evaluate the consequences of selection for maturing rate before such a criterion could be recommended.

CONCLUSIONS

Milk yield per day of calving interval was significantly influenced by year of birth, season of birth, calving order, calving type, drying-off reason and the linear and quadratic effects of both lactation length and maturing rate. Mature weight did not influence the trait analyzed. A significant correlation coefficient between mature weight and maturing rate (-0.59) was obtained, indicating that faster maturing cows are lighter at maturity. The regression equation of maturing rate on milk yield per day of calving interval indicated that the optimum maturing rate of Holstein-Friesian cows that maximizes milk yield per day of calving interval is 0.1141 kg/kg of liveweight/month at a mature weight of 670 kg.

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COUNTRY: BRAZIL

SESSION: SMALL RUMINANTS PRODUCTION

The effect of breed and age on temperament of sheep

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ABSTRACT

This trial aimed to characterize the temperament of sheep in an auction ring. Data from 3223 animals were used: 1924 Corriedale, 443 Polwarth, 100 Merino, 400 Texel, 216 Suffolk and 240 crossbreeds. From the total, 2201 were wethers (up to 1.5 years) and 1222 were ewes (more than 1.5 years). Animals were grouped when entered the auction ring. Temperament was evaluated through attribution of scores according to easiness of entrance in the auction ring (EEP), movement (EMP) and easiness of exit the auction ring (ESP). Score values ranged from 1 to 3, where 1 represent calm animals and 3 the restless ones. Observers were located five rows behind animals in order to not disturb them. Data was analyzed with SAS, procedures GLM and CORR (Pearson), groups were considered as experimental units (n=84), means were tested by Lsmmeans, DMS Fisher test, number of animals per group were used as covariable. Sources of variations tested were breed, age

and interaction. Significant correlations were detected between breed and EMP ($r=0.32$) and ESP ($r=0.31$). Number of animals per group was related to EEP ($r=0.39$). EMP and ESP were significantly affected by breed. Texel and Suffolk animals were more reactive than animals of Corriedale and Polwarth breeds. Merino presented intermediary values for EMP and ESP. It might be concluded that breeds mainly selected for meat production are more reactive than some breeds mainly selected for wool production.

KEYWORDS: behaviour, stress, breed sheep, reactivity

INTRODUCTION

There are several issues to evaluate animal welfare, some of them deal with physical attributes as growth and health, or mental aspects as suffering or nativeness expressed as the closeness to natural environment. On the last decades, researchers have been studying the influence of temperament on animal production. Temperament may be defined as the reactions of the animals to man or management, generally modulated by fear (Fordyce et al., 1982). Fear is a universal emotion in the animal kingdom and motivates animals to avoid predators. However, fear and anxiety are undesirable emotional states as it promotes stress and decrease in animal welfare. Temperament therefore affects economical aspects of animal production (Paranhos da Costa, 2001).

Observations made at auction rings indicate that some animals are more sensitive to sudden movement or intermittent sound than others (Lanier et al., 2000).

Reactions against fearfulness situations are modulated by genetic factors (Grandin & Deesing, 1998). However, previous experience also influence the way an animal react, and animals tend to present lower reactivity scores as they became more experienced (Burrow, 1997).

Becker (1994) related that animals, which suffered traumatic experiences while trying to escape from handling or transport situations, began to show undesirable reactions and lower performance in further reactivity tests, even when these accidents happened after gentle handling. This trial aimed to evaluate the temperament of sheep of different genotype in an auction ring

MATERIAL AND METHODS

In an auction ring, temperament of 3323 female sheep was studied. They were classified by age as wethers (aged up to 1.52 years) and ewes (aged more than 1.5 years) and by breed. Sheep was evaluated in a commercial covered auction ring, with sand floor during a market held during the XIX Feovelha, in Pinheiro Machado, RS, on March 2003. Animals were grouped when entered the auction ring.

Temperament was evaluated through attribution of scores according to easiness of entrance in the auction ring (EEP), movement (EMP) and easiness of exit the auction ring (ESP). Score values ranged from 1 to 3, where 1 represent calm animals and 3 the restless ones. Observers were located five rows behind animals in order to not disturb them. Data was analyzed with SAS, procedures GLM and CORR (Pearson), groups were considered as experimental units ($n=84$), means were tested by Lsmeans, DMS Fisher test, number of animals per group were used as covariable. Sources of variations tested were breed, age and interaction.

RESULTS AND DISCUSSION

The distribution of the animals according to their age was 2021 wethers and 1302 ewes, and according to their breed was: Corriedale (n=1924), Polwarth (n=443), Merino (n=100), Texel (n=400), Suffolk (n=216) and crossbred (n=240).

Significant correlations were detected between breed and EMP ($r=0.32$) and ESP ($r=0.31$). Number of animals per group was related to EEP ($r=0.39$). EMP and ESP were significantly affected by breed. Texel and Suffolk animals were more reactive than animals of Corriedale and Polwarth breeds. Merino presented intermediary values for EMP and ESP. EEP tended to be affected by age. Ewes tended to show lower EEP score than ewes ($P=0.0608$), what may be related to their greater experience to be handled, and it is in agreement to Lanier et al. (2000)

CONCLUSIONS

It might be concluded that breeds mainly selected for meat production are more reactive than some breeds mainly selected for wool production.

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