Economic values for milk production traits for crossbred (Holstein x Gir), Holstein and Gir cattle in Southeast Brazil under different milk payment policies[#].

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Abstract: Until recently milk payment policies in Brazil did not include payment for components. Due to changes in regulation on milk quality requirements by the Government, industries have introduced quality payment policies. To evaluate the relative economic importance of milk and components under different milk payment policies (PP), in the three main genetic groups involved in the milk production in the Southeast Brazil, i.e., Holstein x Gir crosses (HG), Holstein (H) and Gir (G), economic values (EV) for milk (M), fat (F), protein (P) were calculated using a bio-economic model. PP in the basic situation (BS) was based exclusively on the volume (V). Alternative PPs were based on V plus different proportions of F: P values (1: 1, 1: 2, and 2: 4). Relative economic values for M, F and P were, 1.00, -1.59, -0.92 (BS), 1.00, 0.79, 1.45 (1:1), 1.00, 0.79, 3.83 (1:2) and 1.00, 3.09, 8.40 (2:4), respectively for H; 1.00, -1.47, -0.89 (BS); 1.00, 0.74, 1.30 (1:1), 1.00, 0.74, and 3.48 (1:2) and 1.00, 2.85, 7.66 (2:4) respectively for HG and 1.00, -1.27, -0.8 (BS), 1.00, 0.91, 1.49 (1:1), 1.00, 0.91, 3.49 (1:2) and 1.00, 3.33 and 7.43 (2:4) respectively for G. Differences between genetic groups were observed for all PPs and should be accounted when designing breeding programs.

Key words: dairy cattle, crossbreeding, milk production, breeding goals

Introduction

Until recently milk payment policies in Brazil did not include payment for components. The introduction of the new regulation on milk quality requirements by the Federal Government in Brazil in 2005 has lead the dairy industries to the introduction of milk payment policies based on quality parameters (constituents content and bacteriological and somatic cell counts standards). Countries with an historic background of milk quality payment have based dairy cattle selection on economic indexes including milk (carrier) fat and protein production, with a great influence in the development of dairy industry (Willmink, 1988; Harris, 1998). In Brazil, Madalena (2000) compared two different situations of milk payment policies in different states of Brazil, Minas Gerais, in the Southeastern region (no payment for composition) and Paraná, in the Southern region (additional payment according to fat and protein content). Results showed that the selection for fat and protein would be economically advantageous in the situation of Paraná State. Economic values are necessary to assure that the emphasis of selection is proportional to the economic importance of each trait in the breeding goal (AMER et al., 2001). Pieters et al. (1997) in Italy showed the influence of pricing systems when calculating economic values and expected responses to selection. To evaluate the relative economic importance of milk and components under different milk payment policies (PP),in the three main genetic groups involved in the milk production in the Southeast Brazil, i.e., Holstein x Gir crosses (HG), Holstein (H) and Gir (G), economic values (EV) for milk (M), fat (F), protein (P) were calculated.

Material and methods

A bio-economic model was used to describe performance, revenues and costs and to calculate the economic values of different traits for pasture based milk production systems using crossbred cows (Cardoso et al., 2004), which were also adapted for other genotypes (Holstein – H and Gir - G breeds). The sources of farm revenues for the three different commercial production systems are: HG: milk (volume), surplus heifers, culled cows and yearling calves; H: milk (volume), surplus heifers, culled cows (slaughter and production) and one-week male calves. G: milk (volume), surplus heifers, culled cows and yearling male calves.

The policy for milk prices in the basic situation was based exclusively on the volume of milk. Minimum standards to be attained were, 3.1 and 3.0%, for fat and protein contents).

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Herd annual milk (and constituents) production was calculated based on individual monthly production level of cows, which were estimated based on lactation curves for 1st, 2nd and 3rd or more parities, according to the genetic group.

The production systems are described in terms of inputs and outputs, taking into account the average performance of animals in the system. Feeding costs were calculated according to genetic composition, herd production level and management and land use intensification level (fertilisation level). Biological parameters in the model used to establish the basic situation (before genetic improvement), were taken from Brazilian literature to represent the different genetic groups. Information on prices of production components (inputs and outputs) were obtained mainly from monthly economical reports from the Agricultural Economics Institute of Agriculture Secretary of São Paulo State, as well as from other specialised reports (Tables 1 and 2).

To evaluate the effect of possible changes of milk payment policies regarding to the payment for milk components on EV_V, EV_F and EV_P, four possible scenarios taken from a dairy plant located in São Paulo state, for fat to protein price ratios were evaluated: a) 1: 1 (additional values of US$0.43/kg for fat above 3.0% and US$ 0.43/kg for protein above 3.0%); b) 1: 2 (additional values of US$0.43/kg for fat above 3.1% and US$ 0.86/kg for protein above 3.0%) and c) 2:4 (additional values of U$0.86 kg for above 3.1% and US$ 1.72/kg for protein above 3.0%).

Results and discussion

Results on absolute and relative economic values, for the basic situation and for alternative milk component payment policies are shown in Tables 3 and 4. EV_M was set to one and relative EV_F and EV_P were expressed in relation to EV_M (Table 3). Differences between genetic groups were small when economic values were expressed in absolute values. When EV_F and EV_P were expressed in relation to EV_M, differences between genetic groups were bigger for all alternative payment policies. Differences were also observed when economic values calculated for HG and G were expressed in relation to economic values calculated for H (Table 4). Changes in payment policies have been observed in Brazil during the recent years. If commercial producers organize themselves in order to negotiate prices with the industries, they will be able to make better deal and get better prices and quality payment. Given genetic improvement is future oriented, possible scenarios and differences in EV among genetic groups should be accounted for when making selection decisions.

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Table 1. Biological parameters used to describe herd performance in the basic situation for the H, G and HG production systems.

Parameter	H	G	HG
No. Cows	100	100	100
Average Milk production (kg)	7015	2796	4073
Lactation length (days)	335	305	305
Average fat %	3.36	4.42	3.71
Average protein %	3.07	3.23	3.32
Cows in milk (%)	80.68	73	75.00
Conception rate (%)	88	81	88
Calving interval (months)	13.71	13.83	13.36
Voluntary culling rate (%)	7.35	8.67	16.18
Replacement rate (%)	25	16.67	19.24
Herd life (months)	48	72	66
Age at first calving (months)	27	36	33
Cow average body weight (kg)	600	449	514

Table 2. Economical parameters (production components and product prices), in the basic situation, for the H, G and HG production systems.

Production component / products	US$)*		
	H	G	HG
Milk	0.22	0.22	0.22
Culled cows (kg meat)	1.45	1.45	1.45
Surplus heifers	870.00	1000.00	652.00
Culled cows (other herds)	652.00	-	-
Calf[a]	13.00	608.00	108.70
Heifer raising costs	642.00	432.00	388.70
Yearling calf raising costs	-	208.00	205.00
Concentrate	0.17	0.17	0.17
Annual costs (pasture)	776.00	300.87	444.35
Roughage supply[b] (kg MS)			
Maize silage (kg DM)	0.10	-	-
Sugar cane + urea 0.5% (kg DM)	-	0.03	0.03
Semen (straw)	13.00	10.87	10.87

*Currency: US$ 1.00 = R$ 2.30

[a] Calf selling age: one week (H); one year (G and GH).

Table 3. Absolute (a) and relative (r) economic values for H, G and HG, in the basic situation and according to different milk component payment policies*

	M	F	P	M(a)	F(a)	P(a)	M(b)	F(b)	P(b)	M(c)	F(c)	P(c)
H(a)	0.18	-0.29	-0.17	0.18	0.14	0.27	0.18	0.14	0.70	0.19	0.58	1.57
H(r)	**1.00**	-0.69	-0.40	**1.00**	0.34	0.63	**1.00**	0.34	1.67	**1.00**	1.34	3.65
HG(a)	0.20	-0.29	-0.17	0.20	0.15	0.26	0.20	0.15	0.70	0.20	0.58	1.57
HG(r)	**1.00**	-0.64	-0.39	**1.00**	0.32	0.57	**1.00**	0.32	1.51	**1.00**	1.24	3.33
G(a)	0.20	-0.25	-0.16	0.20	0.19	0.28	0.20	0.19	0.72	0.21	0.62	1.58
G(r)	**1.00**	-0.55	-0.35	**1.00**	0.40	0.65	**1.00**	0.40	1.52	**1.00**	1.45	3.23

*Proportions of F: P values: 1: 1 (a), 1: 2 (b) and 2: 4 (c).

Table 4. Relative economic values for HG and G, expressed as a proportion of EV for H, in the basic situation and according to different milk component payment policies*

	M	F	P	M(a)	F(a)	P(a)	M(b)	F(b)	P(b)	M(c)	F(c)	P(c)
HG(r_H)	1.07	0.98	1.03	1.10	1.03	0.98	1.10	1.03	0.99	1.10	1.01	1.00
G(r_H)	1.07	0.85	0.92	1.12	1.30	1.05	1.12	1.30	1.02	1.14	1.08	1.01

*Proportions of F: P values: 1: 1 (a), 1: 2 (b) and 2: 4 (c).