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Research Article

Effects of breed or sex on average daily gain of locals bovine and crossbred. Consequence on milk yield

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Abstract: Two meta-analysis were conducted to determine; (i) the effects of breed or sex on average daily gain of locale and crossbreds cows originating from Ivory Coast and (ii), the effect of breed on daily milk yield of these suckled cows. The first analysis showed that the average daily gain of N'Dama breed (482 g/j) is significantly higher than average daily gain of Baoulé breed (304 g/j). Average daily gain of crossbred (Jersiais x N'Dama) cows did not differ with average daily gain of N'dama or Baoulé breeds. No difference between entire and castrated bulls was noted. The second analysis showed that daily milk yield from suckled cows of crossbred (Jersiais x N'Dama) cows (4, 94 kg/j) is higher more daily milk yield from N'Dama or Baoulé cows (2, 05 and 2, 01 kg/j, respectively). However, there is no difference between in the daily milk yield between N'Dama and Baoulé breeds. Analysis confirmed the interest of crossbreeding local Ivory Coast breeds with jersey

breed, resulting in increased milk production without any deleterious effect on meat production.

Keywords: N'dama – Baoulé – Jersiais x N'Dama – Fattening – Average Daily Gain – Milk Yield.

INTRODUCTION

In Côte d'Ivoire, the N'Dama and Baoulé breeds are the most frequently encountered on cattle farms, even though there is sometimes a third local breed (Lagunaire) ¹. These breeds are used mainly for meat production and to a lesser extent for the production of fluid milk. This is usually low because of the large share of calves. These breeds, most often described as suckling or even mixed breeds, have been the subject of research publications²⁻⁴, in particular because of their hardiness and tolerance to trypanosomiasis⁵⁻⁷.

Work on the two N'Dama and Baoulé cattle breeds focused on fattening through the determination of average daily gain (GMQ) and / or milk production (PL). To improve this last criterion and to benefit from an animal retaining its capacity of fattening, work of crossing was undertaken. The N'Dama breed has thus been crossed with other more productive breeds, such as the Jersey breed, known for its hardiness and milk production ⁶. However, to our knowledge, no study has compared the performances (GMQ, PL) of the 3 breeds (N'Dama, Baoulé and Jersiais x N'Dama). These performances of interest concern the growth of fattening cattle, which are beef (castrated male) and bull calves (whole male) and daily milk production.

To carry out this study, a first meta-analysis was carried out on the effects of race (N'Dama, Baoulé and Jersiais x N'Dama) and sex (beef and bullock), as well as their possible interactions, on the gain daily average (GMQ). In a second analysis, the effects of the race (N'Dama, Baoulé and Jersiais x N'Dama) on the daily milk production were analyzed.

MATERIALS AND METHODS

The database used for this work included the results and performances from 25 publications, including one or two of the three breeds (N'Dama, Baoulé and Jersiais x N'Dama) and / or the type of animal (cow, beef) and / or bull). Compulsory information was breed and type of animal, as well as growth performance (GMQ) and milk production.

For the analysis of the effect of race and sex on the GMQ, we finally selected 19 publications (51 GMQ values, because some publications included the performance of several batches of animals. the base included information from 13 lots with beef performance and 38 with bull issues, and the database used for the breed effect included the performance of 29 N'Dama, 15 Baoulé and 7 Jerseys x N'Dama The average length of GMQ testing was 107 and 273 days for those studying beef and bull, respectively, and race and sex were recoded: 1, 2 and 3 for the N'Dama, Baoulé and Jersiais x N'Dama breeds, then 1 and 2 for the beef and bullock types, respectively.

A similar approach has been taken with regard to milk production. For analysis around milk production, 9 publications specifying this criterion (25 values, because a publication includes one or more measures of milk production) and race (12 N'Dama, 5 Baoulé and 8 Jersiais x N'Dama) have been used. Measurements

for total milk production have an average duration of 246 (\pm 61) days. Daily milk production (PL) was calculated by dividing each total milk production by the duration of its measurement. These values are based on milk milking once a day, without taking into account the quantities drunk by the calf. The cattle breeds were coded as before (1, 2 and 3 for the N'Dama, Baoulé and Jersiais x N'Dama breeds, respectively).

The resulting files were analyzed under the R software, taking into account the race and gender effects for the analysis of the average daily gain (GMQ), and only the race effect for the daily milk production (PL). In the first analysis, the existence of an interaction between race and sex was tested.

RESULTS AND DISCUSSION

The results on the effect of three cattle breeds (N'Dama, Baoulé and Jersiais x N'Dama) on the average daily gain are presented in **Table I**. There is better performance for N'Dama animals than for animals Baoulé (482 vs 304 g /j, $P < 0.05$). Our results confirm the effect of the breed on the fattening⁸⁻¹⁰, with a faster growth in the N'Dama breed. However, the crossed animals show intermediate performances (445 g /j), not significantly different from the other two breeds. This intermediate value for the crossed animals seems to show a minor interest of this type of crossbreeding in N'Dama breed for the only improvement of the GMQ. However, these results should be supplemented with beef quality data (yield, meat content, etc.) because the results of Charray *et al.*⁶ showed that crossbreeding resulted in a better beefiness of crossbred animals. In addition, the carcasses of animals from the Jersi and N'dama crosses give an excellent carcass yield (55.60 to 61.32%) in intensive fattening¹¹. The latter authors also report the efficiency and economic interest of intensive fattening in crossed animals Jersiais x N'Dama.

Table 1: Average daily gain of the three cattle breeds

Bovine Breeds	Average Daily Gain * (g / j)
N'Dama	482 ^a
Baoulé	304 ^b
Jersiais x N'Dama	445 ^{ab}

* A different letter means a significant difference at $P < 0.05$.

There is no significant difference between bullocks and bulls (460 vs 360 g /j). Thus, our analysis did not show a sex effect (beef vs bull) on the GMQ, despite respective values of 460 and 360 g / j for the oxen and bull calves and a non-significant difference of 100 g /j. This would suggest that in fattening, the growth of live weight of beef (castrated male) does not differ significantly from the growth of live weight of bull (whole male). Previously published results have shown that neither age nor castration weight significantly modifies the overall performance of cattle growth^{12, 13}. Indeed, the weight gain acquired by the whole male between 7 and 15 months, when it exists, is probably not maintained until slaughter¹⁴. Thus, the castration of male cattle could be avoided before fattening especially as it is likely to affect their welfare, even

temporarily, given its traumatic effect. Nevertheless, the more aggressive character of whole males would be preserved and would lead to a higher risk of accident.

No interaction between the bovine race (N'Dama, Baoulé and Jersiais x N'Dama) and sex (beef and bull calves) is observed.

Dairy production of crossbred cows (Jersiais x N'Dama) is significantly higher than that of pure breeds: 4.94 kg / day against 2.85 and 2.01 kg / day in N'Dama and Baoulé (**Table II**). The daily milk yield (PL) of the crossed cows (Jersiais x N'Dama) (4.94 kg /j) is higher than that of the pure breeds N'Dama (2.05 kg / j) and Baoulé (2.01 kg) / day). Thus, crossing (Jersiais x N'Dama) has allowed to obtain a dairy production twice as high, but the daily milk production of the 3 breeds of cows milked once a day remain quite weak and inferior to that of the cow Jersiaise treated twice a day (15.9 kg /j; Jersiaise-Mag¹⁵). But in the latter case, the animals are fed in such a way as to fully express their milk potential, via an adequate diet. Thus, the daily dairy production of local Ivorian breeds could probably be improved significantly, by increasing the number of daily milkings (from one to two) and a diet that best meets the needs of animals for breastfeeding and production of milk. In fact, daily milk production is higher during a twice-daily milking compared to once-daily milking in dairy cows (approximately + 30%),¹⁶⁻¹⁸ dairy ewes (+ 16 to 24%)¹⁹⁻²¹ and dairy goat (15 to 20% more)²²⁻²⁴. In addition, the increase in the quality and quantity of the ration distributed would also improve milk composition^{25, 26}.

Table 2: Daily milk production of suckler cows of the three bovine breeds

Bovine Breeds	Dairy Production ¹ (kg / j)
N'Dama	2,05 ^b
Baoulé	2,01 ^b
Jersiais x N'Dama	4,94 ^a

¹ dairy production daily suckler cow deals once a day, not taking into account the milk drunk by the calf.

In the end, the males of the three cattle breeds (N'Dama, Baoulé and Jersiais x N'Dama) can be used for fattening for the production of meat. In addition to raising their calves, females can be used for the production of human milk, and it could be improved by increasing the number of milking, with a revised diet, in quantity and quality.

CONCLUSION

The average daily gain (GMQ) of the N'Dama breed is higher than that of the Baoule breed. The GMQ of the N'Dama and Jersiaise (Jersiais x N'Dama) product is intermediate between those of the two N'Dama and Baoulé breeds, but recoverable milk production for human consumption is more important. This allows a higher milk supply or additional income for breeders. This parameter is important to take into account to

support the Ivorian breeders in their future development choices, but also, for future work on the optimal management and feeding of these animals.

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