

GROWTH OF SUCKLING KIDS OF TWO GOAT BREEDS OF THE LOMBARDY ALPS

P. Crepaldi, S. Giovenzana and M. Cicogna

Istituto di Zootechnia generale, Facoltà di Agraria, Università degli Studi, via Celoria 2, 20133 Milano, Italy

INTRODUCTION

Most autochthonous goat breeds of the Lombardy Alps are now extensively raised. The suckling kid is thus the main product, highly appreciated and requested by the consumers during the Easter season. As few information exist on this type of production in field conditions, we thought it might be interesting to record and compare growth of natural suckling kids from two autochthonous goat breeds of the Lombardy Alps, i.e. Lariana or Livo and Frisa Valtellinese or Frontalasca. The latter is a standardised breed well known and highly praised for kid production. The former is a primary goat population whose Anagraphic Registry has been only recently established. Previously we contributed to the characterisation of this primary goat population with investigations on its phenotypic and visible genic profile (Crepaldi *et al.*, 1999), on the AFLP loci genetic distances from other goat populations (Crepaldi *et al.*, 2001a) and on her milk casein genetic polymorphism (Crepaldi *et al.*, 2001b). The two breeds under study are raised in the same region of Northern Italy, in two near by valleys with no overlapping areas.

MATERIAL AND METHODS

Animals and flock sampled. During Winter-Spring 2000, growth was recorded on restricted natural suckling kids born at the beginning of the kidding season, on a total of 99 Lariana subjects from three flocks in the Livo commune (Como) and of 104 Frisa individuals from four flocks in the Grosio commune (Sondrio). The flocks had been chosen in co-operation with the Provincial Breeders Association's technicians taking care that they would represent the prevalent management techniques used in the compared breeds, where goats, during the kidding and suckling season, are individually tied in the goat house and the kids, kept in groups in small pens, are individually brought to their mothers for natural suckling twice a day.

In all the sampled flocks goats were stabled in goat houses, on straw (Frisa) or on leaves (Lariana) bedding, in the down-hill villages (550-650 m altitude) only for a short period, from January-February until Easter, during the kidding and suckling season. During this period Lariana goats are only fed hay, whereas the Frisa are also supplemented with concentrates. During the rest of the year goats of both breeds graze on medium and high altitude communal pastures. Grassland surrounding the down-hill farms are used for hay making. Only if the maternal milk is insufficient in the final stage kids are fed milk substitutes.

Weight recording. The kid's weights were recorded, with a 25 kg spring balance, at birth, immediately after having been dried and after the first colostrum had been suckled and

then, at weekly intervals, until ready for slaughtering. To allow weighing, the new-born kids were held in a bag, when heavier and difficult to keep still they were slinged with a flat strap. Every kid was weighted 4 or 5 time for a total of 451 and 392 records for Frisa and Lariana breed respectively.

Statistical analyses. Linear and quadratic regression models were used in the analysis of the weight data. An ANOVA model on birth weight, live weight at slaughter and preweaning average daily gain was used to analyse the fixed effect of the genetic group of the kid, the litter size (single vs. twins) and the 2 way interaction “genetic group of the kid x litter size”.

Preweaning average daily gain (ADG) were calculated as the difference between the last and first weight record for every kids.

Biologic efficiency of growth (BE) (Pilla *et al.*, 1987; Portolano and Todaro, 1997) was expressed as the ratio between ADG, in g, and the metabolic weight ($LW^{0.75}$) in kg.

RESULTS AND DISCUSSION

As shown in table 1 a significant difference between the two genetic groups of kids for all the traits studied was found, except for the age at slaughter that was about 38 days for both breeds. Birth weight, live weight at slaughter and the preweaning average daily gain were significantly ($P < 0.001$) higher in the Frisa breed. Also the biologic efficiency of growth, although with a smaller significance ($P < 0.05$), was higher in the suckling kids of the Frisa breed. In agreement with results obtained by Lopez-Perez *et al.* (1998) in the U.S.A., litter size significantly ($P < 0.001$) influenced birth weight and live weight at slaughter: single kids had both heavier birth weight (least means \pm E.S were 5 ± 0.06 and 4.07 ± 0.11 kg, respectively for single vs. twin kids), and live weight at slaughter (11.83 ± 0.19 vs. 10.52 ± 0.14 kg, respectively for single kids vs. twins). The significant ($P < 0.05$) effect of the interaction “genetic group x litter size”, both for the birth weight and the live weight at slaughter, disclosed a more relevant negative effect of twins vs. single in the Lariana goat kids.

Table 1. Average (\pm S.D.) recorded performances

| Breed | BW (kg) | | LWaS (kg) | | AaS (d) | | ADG (g/d) | | BE (ADG g/LW ^{0.75} kg) | |
|---------|-------------------|------|--------------------|------|------------|------|--------------------|------|-------------------------------------|------|
| | mean | S.E. | mean | S.E. | mean | S.E. | mean | S.E. | mean | S.E. |
| Lariana | 4.38 ^A | 0.08 | 10.29 ^A | 0.13 | 38.5 | 0.48 | 154.7 ^A | 3.39 | 12.41 ^a | 0.26 |
| Frisa | 4.97 ^B | 0.09 | 12.49 ^B | 0.26 | 38.2 | 0.91 | 190.0 ^B | 4.66 | 13.17 ^b | 0.19 |

BW: birth weight; LWaS: live weight at slaughter; AaS: age at slaughter; ADG: average daily weight gain; BE: biologic efficiency of average daily gain.

On the same column: ^{a, b} for $P \leq 0.05$; ^{A, B} for $P \leq 0.001$

Figure 1 shows the growth curves of restricted natural suckling kids of the two breeds. Linear regression best fits the records of Frisa kids ($r^2 = 0.77$), with a daily weight gain of 0.19 kg/d. Quadratic regression best represents data of Lariana suckling kids ($r^2 = 0.78$). Only in Lariana suckling kids the quadratic term is highly significant ($P < 0.001$) and

negative, thus showing that in this breed daily weight gains decreased with age and that the LW difference in favour of Frisa kids increased from 0.59 kg at birth to 2.2 kg at slaughtering. This trend could be due to the well known influence of pre- and postpartum nutrition on growth of kids (Bajhau and Kennedy, 1990).

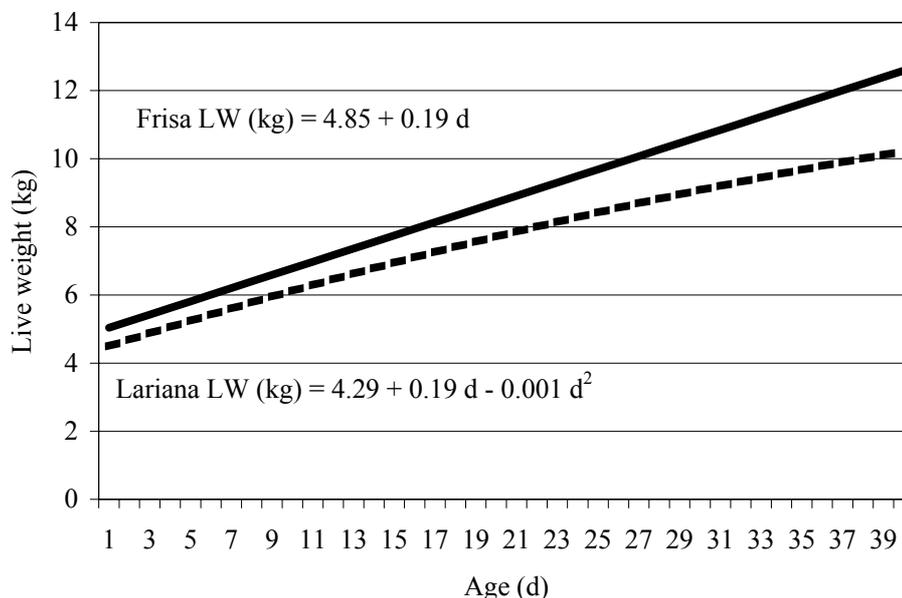


Figure 1. Growth curves of natural suckling kids

CONCLUSION

The naturally suckled kid is now the main product of most autochthonous goat breeds extensively raised on the Lombardy Alps. With the assessment in field conditions of this up to now scarcely documented productive trait we intend to contribute to a better characterisation of the Frisa Valtellinese or Frontalasca and Lariana or Livo goat breeds. Both these breeds are traditionally appreciated and requested by local consumers for the production of suckling kids during the Easter season. The recorded data show better performances, with higher birth weights, live weights at slaughter, pre-weaning daily gains and biologic efficiency for the suckling kids of the Frisa breed. This is not surprising if one considers the higher size of the Frisa goat (mean \pm S.E of height at withers: 79.2 ± 0.3 cm), compared with the Lariana (72.3 ± 0.4 cm)(Crepaldi *et al.*, 2001a). The negative deflection of the growth curve, only shown by the Lariana suckling kids, could indicate an inadequate pre- and/or post partum nutrition of these goats which are probably raised too sparsely. In fact, as above mentioned, the Lariana goats are

grazed with no supplementation on the high altitude pastures until the Winter weather allows it, usually for most of the pre-partum period, and are then stabled and fed only hay in the down-hill villages only for a very short period, during the kidding and suckling season. The hypothesis that the frugal farming system of the Lariana limits the growth potential of her suckling kids is further confirmed by the more relevant effect on performance of litter size in Lariana vs. Frisa, with a lower birth weight and live weight at slaughter in twin vs. single kids. Therefore for a more accurate comparison of the genetic potential of the naturally suckling kids of these two breeds an experimental trial should be undertaken in a more comparable management conditions.

However it should be considered that, at present, the suckling kids of Lariana goats are highly appreciated and requested by the consumers for the right size of the carcass, fitting well to family consumer requirements (about 10-12 kg), and for the quality of the meat associated with the extensive raising techniques.

ACKNOWLEDGEMENTS

The kind availability and co-operation of the farmers, of the Provincial Breeders Associations of Como-Lecco and Sondrio and of Doctors G. Invernizzi, C. Pruneri, G. Cioccarelli and I. Robustelli are greatly acknowledged. The investigation was cofinanced by MURST (1999).

REFERENCES

- Bajhau, H.S. and Kennedy, J.P. (1990) *Small Rum. Res.* **3** : 227-236.
- Crepaldi, P., Gemo, G.L., Brambilla, L., Cicogna, M. and Renieri, C. (1999) *Zoot. Nutr. Anim.* **25** : 229-242.
- Crepaldi, P., Negrini, R., Milanesi, E., Gorni, C., Cicogna, M. and Ajmone-Marsan, P. (2001a) *J. Anim. Breed. Genet.* **118** : 173-180.
- Crepaldi, P., Marilli, M., Verdognia, L., Meggiolaro, D. and Cicogna, M. (2001b) *Proc. XIV Congr. A.S.P.A., Firenze* 88-90.
- Lopez-Perez, D., Lukefahr, S.D. and Waldron, D.F. (1998) *Sid Sheep Goat Res. J.* **14** : 144-147.
- Pilla, A.M., Catillo, G., Gigli, S. and Romita, A. (1987) *Ann. Ist. Sper. Zoot.* **20** (S.S.2) : 27-44.
- Portolano, B. and Todaro, M. (1997) *Ann. Zootech.* **46** : 245-253.