

Short Communication

Indigenous goat meat potentialities and the impact of the management mode on herd's performances in Tunisian arid area

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Data obtained from the survey of 10 local goat herds were analyzed to establish the impact of management mode on local goat performances, with the aim of identifying the possibilities of improving goat production via the handling of flock management. In extensive husbandry on rangelands, the local population registered low performances which are similar to those known for indigenous caprine breeds of marginal zones. Average kid's weight was 5.1 kg at one month old. The kid's birth weight increased with about 21%, but the oasian kids' superiority seems to progressively elapse with only 2% at four months old. Thus, genetic evolution promoted growth performances as a biological priority for producing caprine meat which remains the principal herds' output. Whereas, dairy performances needing high nutritive requirements were seriously reduced by the natural selective process.

Key words: Indigenous goat, kid's growth, management mode, arid zone, natural selection.

INTRODUCTION

In Tunisia, the national caprine herd, estimated to be about 1,500,000 does, is mainly raised on arid rangelands. With scarce resources and harsh irregular climatic environment, local goat population remains the suitable animals in the arid pastures and the main product of ambulant herds is the kids' meat. Kids were not weaned till their separation in summer when they were slaughtered and the weaned kids' meat contributed about 75% of the regional meat production.

Rather than the extensive pastoral mode, goats are traditionally raised in the oases in small flocks under intensive management, and goat husbandry plays a key role by its significant various contributions to farmers' incomes (D'Aquino, 1995).

The present study aimed to identify the local goat meat potentialities in two different breeding modes through a statistical comparison between performances realized in pastoral system on rangelands and those registered in the intensive oasian mode. Results should set the possibilities of improving each goat performance by acting on genetic and/or environmental factors.

MATERIALS AND METHODS

Data base editing and analysis

The study used a herd containing animals considered as local population. This group of animals is known by its adaptation to harsh conditions, scarce resources and irregular climate. Rather than the management mode's effect, some non genetic factors were statistically analyzed to identify the variation factors of kid's weights. The GLM procedure (General linear model), illustrates that only the management mode had a significant effect ($p < 0.05$) upon kid's growth at studied ages." This can be explained that the whole variability is mainly oriented by the management system impacts on phenotypes. This variance structure can cover the quadratic effects of "minor" factor which amply affected the animal phenotype when only one production system was analyzed. The normality tests

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Abbreviations: DAG, Daily average gain; SNK, Student-Newman-Keul test.

Table 1. Kids' growth parameters in oases and on rangelands with the percentage of averages improvement.

Weight	Oasian mode			Pastoral mode			(%)*
	Mean	Minimum	Maximum	Mean	Minimum	Maximum	
Birth	2.92 ^{a**}	1.20	3.00	2.41 ^b	0.78	2.63	121
30 days	6.69 ^a	3.30	10.40	5.06 ^b	1.78	5.56	119
60 days	9.47 ^a	5.80	16.30	8.05 ^b	2.46	8.77	117
90 days	11.88 ^a	6.80	20.90	10.64 ^b	3.35	11.45	112
120 days	12.85 ^a	7.00	22.30	12.58 ^a	4.47	13.37	102
Total kids		1928			722		

*Average improvement percentage; **, the same letter corresponds to the statistical homogenous classes (Test SNK).

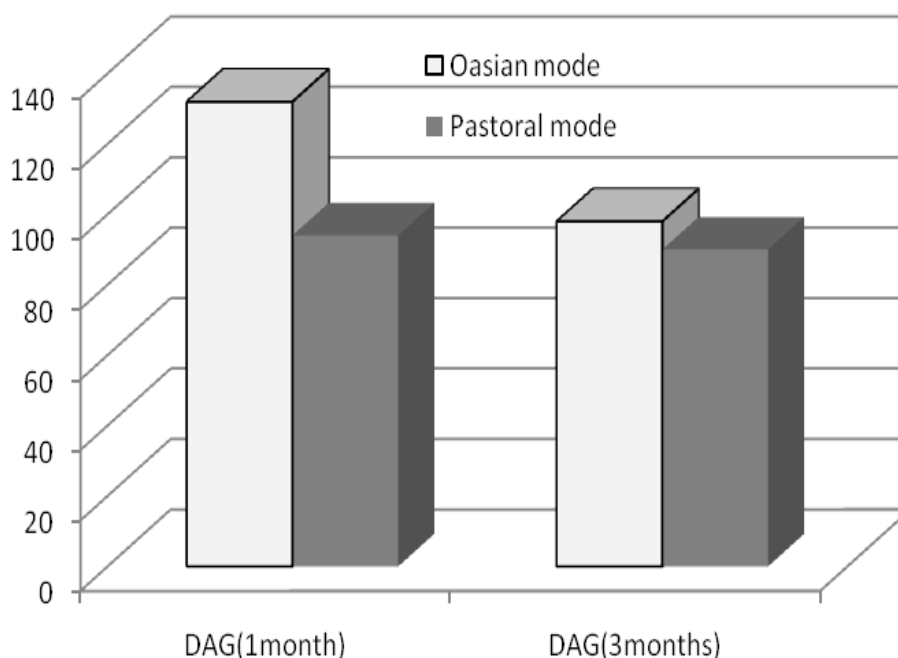


Figure 1. Kids' daily average gain (g.day⁻¹) from birth till one or three months of age in oases and on rangelands.

show that considering all potential factors does not ensure the normality distribution. So, we do not include it in the present study because the objective is reduced to comparing the effects of the management system which does not allow the illustration of the effects of environmental factors. Data analyzed correspond to records of kids' growth registered separately on pastures in extensive breeding mode and in oases where herds were intensively fed. Data base relative to the pastoral mode contains 722 annual kids' weight control files, whereas in oases for the intensive mode, we used 1928 kids' growth data.

Every year, the kids are weighed since birth (normally since December) and the growth is registered every 21 days till summer in June when the kids reach the age between six to seven months. After files were edited, data base was used to estimate the individual performances (growth performances) for each kid, the weight curve was established by Gompertz model to estimate individual weight at typical ages thus; at birth, 30, 60, 90 and 120 days. Also, the daily average gains (g.day⁻¹) of one and three months old were estimated in each breeding system.

Individual kids' and does' variables were analyzed by analysis of

variance (ANOVA) procedure and the Student Newman Keuls means comparison test (SNK, $\alpha = 5\%$).

RESULTS AND DISCUSSION

Table 1 compares the kids' growth and their variation magnitude from birth till four months in the pastoral mode on rangelands. Figure 1 illustrates the respective daily average gain of kids' weight during 1 and 3 months.

Since birth, the indigenous kids' weight manifests significant difference in the husbandry mode. Oasian kids have about 21% of birth weight, which was superior to that of their colleagues raised on rangelands. It seems that better feeding conditions leads to a higher foetal growth as it was confirmed by El Abid and Abu Nikhaila (2009). Non-genetic factors such as management mode

are largely expected to affect kids' survival and prenatal growth (Ameh et al., 2000; Nnadia et al., 2007). After birth, the oasian kids' weight superiority progressively elapsed with their age (Table 1). In fact, the kids' average weight becomes statistically similar with the two studied husbandry modes at three months old. Indeed, differences in average weight were reduced to only 270 g at 120 days, always in favour of the oasian kids. Figure 1 illustrates that the observed daily average gain (DAG) of oasian kids reached 130 g day^{-1} during the first months of age and became more and more similar among management modes at later age. This early rapid growth of the oasian kids can be explained by the better dairy performances of does under intensive conditions.

Rather than feeding conditions, this aspect illustrates the local kids' growth kinetic with regard to age; in fact, concluded that the local kid's growth rate decreases significantly with age due to genetic potentialities of the indigenous group of animals. Thus, indigenous kid becomes progressively unable to valorise intensive conditions by an additive meat production and seems to reach its asymptotic weight at an early age .

Moreover, results show that the weight at birth can be improved by acting on some environmental factors. In fact, the local goat mating period is summer when the arid area conditions are worst during the year. The aestival temperatures are known as the hottest and the forage resources become very scarce. Consequently, having low birth weight is mainly due to non genetic factors and can be improved under intensive mode . On the other hand, several indigenous caprine breeds and populations register a reduced weight at birth under extensive pastoral grazing. Equally, a low birth weight is usually considered as a genetic adaptation criterion to harsh environment because this weight is highly correlated with the adult weight.

Regarding the weights variation magnitude, the maxima performances seem largely higher under oasian conditions where some kids are able to realize a sufficiently heavy weight, which can reach 22.3 kg at four

month age (Table 1). Such high weights could not be observed in extensive mode even for reduced cases. So the local population contains some high genetic potentialities, but they cannot be expressed under harsh pastoral conditions due to environmental factors.

The study results illustrate that to build genetic improvement program of the local goat, we have to consider that this group of animals has a specific genetic potentialities which differ for each performance. Under intensive production mode, without restrictive conditions, animals improve their production until a level defined by their genome. This last biological level varies with the performance and the animal group genetic structure.

Consequently, both production objectives and improvement programming have to consider such genetic characteristics issued from long natural selection process. When the meat output of herd seems to improve using a good management program, there are usually serious genetic limits to producing more milk from the local goat. Nevertheless, the existences of reduced number of high-performance goats makes for the selection of nucleus, with the aim to produce local goat dairy specialized in the intensive breeding modes.

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