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VARIABILITY AND EVALUATION OF THE GROWTH PERFORMANCE OF THE KIDS GOATS IN THE ARGANERAIE OF AGADIR IN MOROCCO

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Abstract

One of the main sources of income for the rural argan grove population in the Agadir region is goat farming, and it is almost exclusively geared towards meat production. The goat herd is often led extensively where the rangelands are the main source of food. The objective of this study is to assess the variability in growth performance of kids of the main local breeds. Increasing the production of this herd requires improving the technical level of farms and the selection of individuals with good growth performance. The evaluation of the variability of growths was analyzed on 341 kids (167 males and 183 females). The data presented are adjusted for the factors of variation: litter size, sex of the kid, season of birth, age of the mother, birthing rank and breed of the mother. The birth weights, 10 days, 30 days and at 70 days are respectively 1.98 ± 0.32 kg, 2.61 ± 0.47 kg, 3.75 ± 0.74 kg and 5.45 ± 1.26 kg. The average daily gains (ADG 0-30 d) and (ADG 30-70 d) are 63.38 ± 6.68g and 43.99 ± 4.26g respectively. The local goat population studied is characterized by great variability for the measured growth parameters. The results of the Anova (GLM model) revealed differences between the different local breeds and revealed the influence of certain factors of variation analyzed on the growth of kids. Better control of the technical management of farms and selection of the best brood stock are necessary to have a better productivity.

Key words*: goats, local breeds, growth performance, variability, Arganeraie (argan forest).*

INTRODUCTION

Goat herds account for just over 1 billion goats worldwide, of which about 420 million head (40.9%) are raised in Africa. Morocco's goat herd currently accounts for 5.23 million head (FAO, 2017) is composed mainly of hardy local breeds which are characterized by a good adaptation to local climatic conditions and it is mostly concentrated in difficult and mountainous areas (Benlekhal and Tazi, 1996).
Goat farming is a key sector of agriculture and its versatile function, is of socio-economic importance and plays a dynamic role in the development of economic activity in rural areas. Knowing the growth dynamics of young animals may be used as one of the indicators to evaluate the level of adaptation under conditions of a given production system (Kume and Hajno, 2010).
The livestock system is extensive, traditional and oriented exclusively for the production of meat. The goat herd is heterogeneous and composed mainly of local breeds, with the dominance of the Atlas (Black) and Barcha breeds which represent approximately 80% of all goats (El Kheyyat and El Madidi, 2020). The main objective of this study is the analysis of the variability of the growth characteristics for the kids of the local goat breeds in a context of extensive system farming in the region of Agadir in Morocco.

MATERIALS AND METHODS

The study was conducted in Amskroud commune in the province of Agadir (Figure 1) with 35 goat farmers randomly selected in 9 villages.
For the monitoring of the animals of each farm, the goats were identified by ear tags with a number specific to each animal.
Live weight at birth (0), 30 and 70 days of kidding and parity of doe were recorded under the existing management conditions by recruited enumerators.
Birth date, birth weight, gemellarity and sex of kid were recorded within 24 h of the new birth.

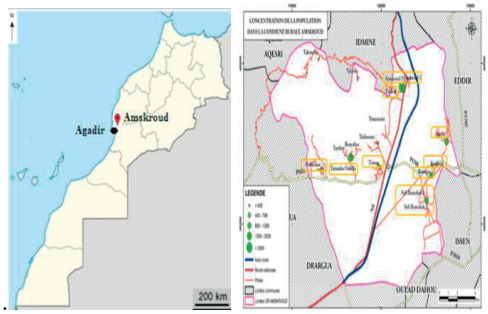

Figure 1. Map showing location of the study area (left) and location of villages sampled (right)

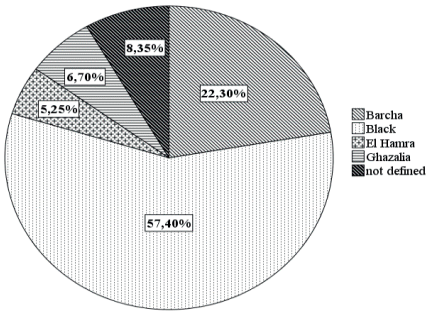

Figure 2. The percentages of the different goat breeds in the study area

Kids were weighed using Brecknell 235 10S Hanging Scale having 50 kg capacity and 200 g division within 24 h after birth. Growth traits of 341 kids were classified according to sexes and seasons. All the kiddings recorded during the period were classified into four seasons (winter, autumn, spring and summer). The births recorded were also classified according to their sexes.

The used GLM model of the following:

Yijk = m + Ai + Bj + Ck + eijk. Where the symbols of this model are: Yijk: the measured values of Breeds (i), season of kidding (j) and sexe (k) , m: Mean of total observed values, Ai: Effect of Breeds (i = 4), Bj: Effect of season of kidding (j = winter, spring, summer and autumn), Ck: Effect of sexe (males and females) and eijk: the residual error.

All statistical analyzes were performed using SAS version 9.3 software. The direct effects of the different factors on the weights at different ages were obtained by an ANOVA analysis using the PROC GLM.

RESULTS AND DISCUSSIONS

The goat population of the commune is composed mainly of 3 local breeds: Atlas (Black), Barcha, and Ghazalia with respectively 57.4, 22.3 and 6.70% (Figure 2).

The weight at birth, weights at 10 days, weights at 30 days and weights at 70 days varied between 1.43 to 2.76, 1.4 to 3.88, 2.05 to 5.41 and 2.87 to 9.55 kg, respectively. The average daily gains, ADG 1 (0-30) and ADG 2 (30-70) varied between 20.8 to 108.97 and 21.3 to 128.72g respectively (Table 1).

For weights at typical age, the coefficient of variation (CV) estimates ranged from 16.21% to 23.17% whereas for the average daily gain, we observed that the coefficient of variation are higher and are equal to 41.90 and 48.36 % for ADG 1 (0-30) and ADG 2 (30-70) respectively. Relatively low weights of kids are often obtained among local populations in extensive pastoral conditions, this is linked to the difficult breeding conditions and the availability of fodder (Alexandre and Mandonnet, 2005; Dereje et al., 2015; Tolera et al, 2000).

Under arid harsh conditions, environmental factors act on herd production by the bias of the resources variation and the climatic stresses intensity (Sghaier et al, 2007).

Table 1. Descriptive statistics for the measured characters (growth traits)

Parameters	N	Mean	Min	Max	SD	CV (%)
BW (Kg)	341	1.98	1.43	2.76	0.32	16.21
W10 (Kg)	341	2.61	1.4	3.88	0.47	17.95
W30(Kg)	331	3.75	2.05	5.41	0.74	19.81
W70(Kg)	318	5.45	2.87	9.55	1.26	23.17
ADG1 (g)	331	63.38	20.8	108.97	6.68	41.90
ADG2 (g)	318	43.99	21.3	128.72	4.26	48.36

ADG: Average Daily Gains, BW: birthweight, W30: weight at 30 days, Min: Minimum, Max :Maximum, SD: Standard deviation, CV: Coefficient of variation. ADG 1: (0-30 days) and ADG 2: (30-70 days).

Influence of breeds on the growth traits

Between breeds, the analysis of variance has showed a significant effect for W10 d, W30 d and highly significant effect for ADG (0-30) and ADG (30-70) (Table 2).

Table 2. Results of ANOVA (GLM)

Factors	ddl	WB	W30	W70	ADG1	ADG2
Breeds	3	0.78	3.16 *	1.16	4.58 **	3.98 **
KS	3	6.48 ***	6.51 ***	8.25 ***	5.39 **	7.46 ***
Sexe	1	3.51 *	4.69 *	2.95	2.70	0.65
Error	333					
Total	340					

WB: birth weight, W10: weights at 10 days, ADG:Average Daily Gains, KS:kidding Season. *, **, *** Significant at 0.05, 0.01 and 0.001 levels, respectively.

Table 3. Influence of breeds on the growth traits (Mean ± SD)

Breeds	N	WB (kg)	W70 (kg)	ADG(0-30)(g)
1 Black	74	1.92 ± 0.32 a	5.22 ± 1.27 a	61.47 ± 4.22 a
2 Barcha	30	1.93 ± 0.33 a	5.44 ± 1.38 a	59.48 ± 7.76 a
3 Ghazalia	38	1.97 ± 0.29 a	5.82 ± 1.35 a	69.02 ± 7.15 ab
4 Cross Pop	199	2.01 ± 0.30 a	5.47 ± 1.20 a	76.57 ± 7.82 b

Means followed by the same letter (s) are not significantly different at 5 % level of probability.

Figure 3 and Table 3 show that for birth weights the different breeds have almost similar mean values. For the weight at 70 days, we observe differences between the breeds but which remain statistically insignificant with average values which vary between 5.22 kg for Barcha and 5.82 kg for Ghazalia.

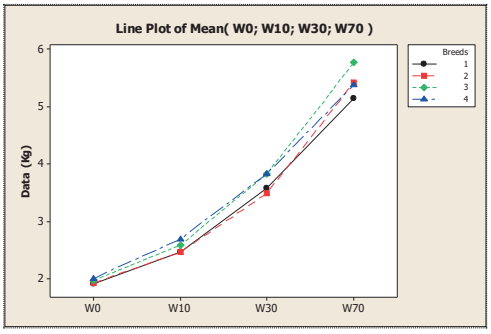

Figure 3. Growth trends of different goat breeds

For the average daily gains (ADG), we observed more pronounced and significant differences between breeds. For ADG1 (0-30), the lowest value is observed in the black breed (61.47 ± 4.22) while the highest value is recorded in the cross-population breed (Table 3 and Figure 4).

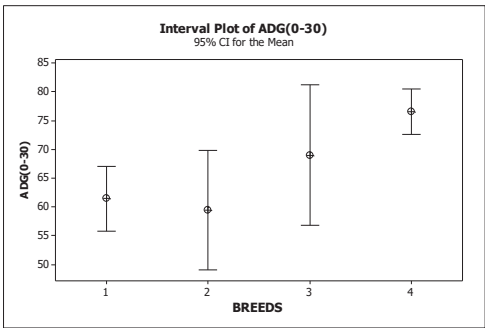

Figure 4. Effect of the breed on ADG (0-30)

Influence of the birth sex

Table 2, Table 4 and Figure 3 shows that the sexe of kids had significant influence on the BW, W10 and W30, However, kids's sexe had no significant effect on the W 70, ADG (0-30) and ADG (30-70).

The sex of the kids has a significant influence effect for WB, W10 and W30. The standard weights of males were significantly higher than those of females for all the growth traits measured (Figure 6). For birth weight, the average weights recorded are 2.03 kg in males and 1.94 kg in females (Figure 5).

For weight at 70 days, the average values recorded in males and females are 5.53 and 5.39 kg respectively.

These results are in agreement with those of several authors who have reported that the weights at typical ages of male kids goats are greater than the weights of female kids goats (Hagan et al., 2012; Meza-Herrera et al., 2014; Zahraddeen, 2008).

Table 4. Influence of the sex on the growth traits (Mean ± SD)

Sex	N	WB (kg)	W70 (kg)	ADG(30-70)(g)
1. Males	162	2.03 ± 0.90 a	5.53 ± 1.19 a	73.53 ±6.72 a
2. Females	179	2.04 ± 0.93 b	5.39 ± 1.30 b	68.61 ± 3.85 a

Means followed by the same letter (s) are not significantly different at 5 % level of probability.

The kidding season shows a highly significant effect ($P<0.01$) for all the growth parameters analysed (Table 2).

Table 5 presents the results of the influence of the season. This table shows that the birth season had significant influence on the WB, W70 and ADG (30-70). For the all growth parameters,

kids born in the rainy and mild season had higher growth than those born in the dry and hot season.

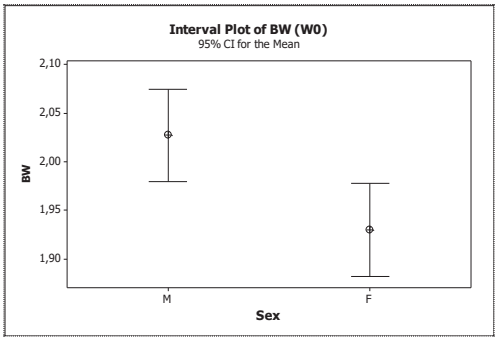

Figure 5. Effect of the birth season on birth weight

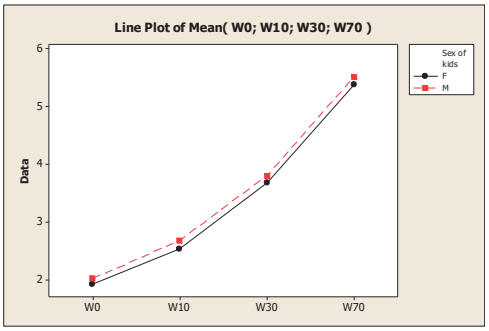

Figure 6. Growth trends by sex of kids

Influence of the birth season

For birth weight, the highest value is that recorded in winter (2.24 ± 0.33 kg) and the lowest is observed in summer (1.79 ± 0.30 kg) (Figure 7).
For weight at 70 days, the highest and lowest values are recorded in autumn (5.83 ± 1.24 kg) and summer respectively (4.87 ± 0.56 kg).

Table 5. Influence of the season on the growth traits (Mean ± SD)

Seasons	N	WB (kg)	W70 (kg)	ADG (30-70)(g)
1. Autumn	108	2.16 ± 0.30 a	5.83 ± 1.24 a	49.26 ± 5.14 a
2. Winter	157	2.24 ± 0.33 a	5.43 ± 1.33 a	44.16 ± 3.48 ab
3. Spring	45	1.98 ± 0.29 a	4.90 ± 1.08 b	36.62 ± 6.27 c
4. Summer	31	1.79 ± 0.30 b	4.87 ± 0.56 b	40.31 ± 3.89 bc

Means followed by the same letter (s) are not significantly different at 5 % level of probability.

The significant effect of season on growth trays of kids is reported in the literature (Ahuya et al., 2009; Elabid, 2008; Supakorn, and Pralomkarn, 2009). In a context where animal feed is based almost entirely on theextensive grazing, the strong seasonal variations in the availability of fodder act positively or negatively on growth parameters.

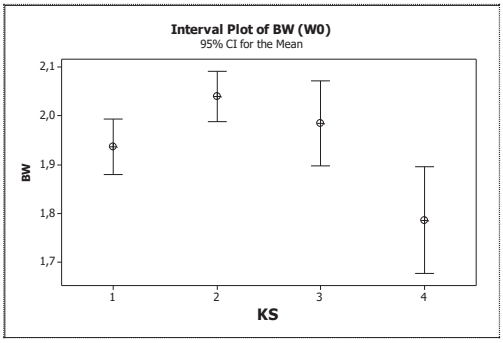

Figure 7. Effect of the birth season on birth weight

However the cold and rainy season, autumn and winter, are the favorable seasons for the WB. However the hot and dried seasons, spring and summer, have disadvantaged the production. This shows production is highly sensitive to the seasonal variations. Many researchers have stated that the season has a significant impact on growth traits (Al-Shorepy et al., 2002; Caro Petrović et al., 2012; Zhang et al., 2009).

CONCLUSIONS

The values recorded in this study are relatively low compared to those observed in other breeds and under more favorable conditions. Environmental effects estimated in this study are important and need to be taken into account for local goat management and breeding improvement. The improvement of technical farming conditions and the selection of more efficient individuals for growth traits are essential for improving productivity in this region.

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