# Dairy production in the indigenous Arbia goat breed and growth performance of their kids in Algeria

*Hind Houssou*, Abir Labiod, Aya Ramdani and Tarek Khenenou*

## Abstract

Knowledge of dairy potential is essential to create products that fully express their genetic potential. This study was carried out on 94 Arbia adult goats and 65 kids ($n$=195) (February – May 2022) in the wilayas of Souk-Ahras and Tebessa with the aim of estimating the dairy potential of the breed, and the daily gains (ADG) between birth and 90 days of age. The data revealed that daily milk production ($n$=94) was 0.89±0.85 litres per day. Milk quality was characterised by an average composition of 3.2% fat, 13.46% total protein, 17.28 % total dry extract, 0.78% salt, pH 7.08±0.01, acidity 17.7°D, density 1032 and protein/fat ratio 4.29. Regarding growth performance, the average birth weight was W0 = 1.80±0.61 kg, while the average at 90 days was W90 = 10.05±2.02 kg, which corresponds to an overall daily weight gain of ADG0-90 = 91.66 g/day. The study showed that birth weight was not affected by sex ($P$>0.05), though males grew faster after weaning ($P$<0.05), and the performance aspect carried out by some physicochemical characteristics of milk was affected by area ($P$<0.05). The study results indicated that the local breed goat had good production dairy performance and goat kids demonstrated acceptable potential for meat production under the semi-arid Algerian environmental conditions. Therefore, it would be suitable to check for the presence of lactogenic plants on the pastures of these breeders to enhance production.

**Key words:** *Algeria; goat; milk; production; weaning*

## Introduction

According to the FAO (Food and Agriculture Organization), the goat population in Algeria was estimated at 4.9 million in 2018 (FAOSTAT, 2018). There are about 1.5 billion goats around the world indicating that this animal resource might constitute an important source of protein. More than 90% are located in Asia and Africa, and only 1.8% in Europe (Monteiro et al., 2017). In many countries, goat milk products, primarily cheeses, are recognized as delicacies and festive products.

Hind HOUSSOU*, (Corresponding author, e-mail: houssouhind@yahoo.fr), Institute of Agronomic and Veterinary Sciences, Souk Ahras University, Algeria; Laboratory of Sciences and Techniques of the Living, Souk-Ahras University, Algeria; Abir LABIOD, Aya RAMDANI, Institute of Agronomic and Veterinary Sciences, Souk Ahras University, Algeria; Tarek KHENENOU, Laboratory of Sciences and Techniques of the Living, Souk-Ahras University, Algeria

A new dairy goat industry is developing in countries that have not had a long tradition of goat milk consumption, such as China, the US, and New Zealand (Lad et al., 2017; Ruiz-Morales et al., 2019; Miller and Lu, 2019). The nutritional and digestive qualities of milk are undeniable, it is less allergenic, undergoes lactic fermentation more slowly than cow milk, and it is used as a medicine for the treatment of certain diseases (Djouza and Chehma, 2018). These properties are the result of the physicochemical characteristics.

In Algeria, goat farming allows their pastoral resources to be transformed into quality products; goat milk and goat meat are indeed interesting nutritional sources, but also contribute to the income of rural populations (Belantar et al., 2018). The problem with the Algerian goat chain is the increasing consumer demand for goat milk from low-input livestock systems. Native goats are mainly reared in suckling systems for meat production (Sahraoui et al., 2020).

Algerian indigenous breeds are composed of very heterogeneous animals; Kabyle breed, occupying the mountains of Kabylie and Aurès; Makatia breed, located in the highlands and northern areas; M'Zabia breed, located in the northern part of the Sahara and the most important of these Algerian local populations is Arbia breed. It is located in the steppe zone, semi-steppe areas, and highlands (Aissaoui et al., 2019).

Growth is the most important trait in small ruminant production revealing the genetic potential of goats before weaning the kids. Although in recent decades there has been great progress in research concerning goat breeding in Algeria, there is still much work to be done, particularly in the applicability of different populations to different environmental conditions. The present study aims to characterise the potential of goat production that has not yet been fully exploited to enhance the livelihoods and sustainable development of this population in Algeria.

## Materials and methods

### Description of the study area

The test was conducted in the two wilayas in northeastern Algeria (Souk-Ahras and Tebessa) near the Tunisian border. The northern part of the Souk-Ahras region is exposed to Mediterranean climatological influences, while the southern part is characterised by a semi-arid climate

### Data collection

Dairy production estimation was based on a quarterly assessment of 94 multiparous lactating Arbia goats ranging in age from 1 to 6 years, at two private farms using an intensive breeding system in Souk-Ahras ($n$=50) versus two private farms using an extensive breeding system in Tebessa ($n$=44).

For the characterisation of physicochemical parameters of raw milk, 94 samples were taken from these goats on the same day. Milk sample were kept cold (4°C) before and during the analysis period in the Feth-Allah quality control laboratory in Tebessa, according to international standards and techniques (AFNOR). All procedures used in this study were approved by Souk-Ahras University Animal Ethics Committee (Algeria).

The study included 180 kids in total (88 males and 92 females during the first 3 months of age. Kid live weight at Souk-Ahras ($n$=96) versus two private farms using an extensive breeding system in Tebessa ($n$=84) was assessed at weaning and different ages: 0, 30, 60, and 90 days using an electronic scale (maxi-

mum 180 kg). The characterisation of the average daily weight gain is a part of advanced production characterisation. Growth performance was determined by a rhythmic control born from single births every 30 days. The overall growth rate (Average Daily Gain, ADG) was calculated as the weight at four (birth weight at birth (grams)/90).

### *Statistical analyses*

All data were coded and recorded in an excel sheet. The descriptive analysis of the data was performed using the SPSS version 20 tool focused on the determination of the mean values, standard deviations, minima and maxima of the studied parameters.

### *Ethical statement*

The animals used in this study had their origin on semi-arid farms with a traditional management system. They were intended for the production of milk and meat for human consumption. These animals were submitted to practices standardised and regulated by international guidelines for animal welfare (Terrestrial Animal Health Code 2018, section 7, Art 7.1) and national executive decree No. 95-363 of November 11, 1995 (Algeria).

## Results and discussion

### *Milk production*

Tables 1 and 2 show the daily milk production and physicochemical analyses of milk: fat, density, dry extract, proteins, acidity, pH, salt, and protein /fat ratio.

The daily milk production was estimated at 0.89±0.85 litres per day. No significant difference was noted in milk production between Souk-Ahras and Tebessa ($P$>0.05). The daily production of this goat is similar to Makatia goat which produces from 1 to 2 litres/day in Algeria (Hellal 1986) and very similar to the Arbia goat (0.89±0.91 kg per day) conducted under extensive breeding conditions in Biskra province (southeast Algeria) (Djouza and Chehma, 2018). In Algeria, mountain goats possess good genetic potential, although the actual efficiency of production is still not known due to the practicing of traditional management and nutrition.

According to Djouza and Chehma (2018), milk production is affected by several factors. Those related to the animal (female) include breed, size, weight, age, etc. and/or the environment (temperature, playtime, etc.). El-Gendy et al. (2014) reported that the shape and size of the udder and teat are important determinants of milk yield and ease of milking or milking ability of dairy animals, while the health of the animal, especially of the udder, are important factors of milk yield.

The acidity of goat milk was higher in Souk-Ahras (19.7°D) than in Tebessa (15.6°D) which could be explained by the consumption of halophyte plants in

**Table 1.** Daily milk production

| Variables | Mean | SD | Min | Max | Variance | *P* |
|---|---|---|---|---|---|---|
| Total daily production (litres) | 0.89 | 0.38 | 0.5 | 2 | 0.152 | |
| Daily production Souk-Ahras (litres) | 0.85 | 0.35 | 0.5 | 2 | 0.150 | |
| Daily production Tebessa (litres) | 0.93 | 0.42 | 0.5 | 2 | 0.155 | ns |

Ns: not significant

**Table 2**. Physicochemical analyses of goat milk

| Parameters | Total N=94 | Souk-Ahras N=50 | Tebessa N=44 | *P* |
|---|---|---|---|---|
| Age | 3.30±1.54 | 3.17±1.40 | 3.65±1.54 | ns |
| Acidity (°D) | 17.7±0.35 | 19.7±1.71 | 15.6±0.22 | * |
| Fat % | 3.14 ±0.31 | 3.10±0.12 | 3.30±0.74 | ns |
| Proteins % | 13.46±0.53 | 17.03±0.14 | 9.89±0.29 | * |
| Density (g/mL) | 1.03±0.00 | 1.03±0.01 | 1.04±0.01 | ns |
| pH | 7.08±0.01 | 7.06±0.01 | 7.10±0.01 | ns |
| Dry extract % | 17.28±4.06 | 21.35±0.07 | 13.22±0.11 | ns |
| Salt % | 0.79±0.37 | 0.83±0.11 | 0.743±0.02 | * |
| Protein/fat ratio | 4.29 | 5.49 | 2.99 | * |

ns: non-significant, *: significant at $P<0.05$

the rangelands. Djouza and Chahma (2018) found an acidity of (18.2°D) in Arbia goat in Biskra. Noutfia et al. (2014) reported an acidity of 17.7°D in Draa goat in Morocco. According to the FAO (1990), goat milk should have an acidity between 14-18°D. According to Boumendjel et al. (2017), the increase in acidity is an indicator of the keeping quality of milk and can only result from the consequent development of lactic flora, influenced by the effect of an increase in temperature and milk storage time.

Regarding fat content, we recorded a content of 3.30% for Tebessa milk, and 3.10% for Souk Ahras milk. The observed averages for fat contents are similar to results obtained by Djouza and Chehma (2018) in Biskra (3.48%), and in the local goat population of Tizi-Ouzou (northern Algeria) of the order of 3.0% and 2.7% reported by Matallah et al. (2020). These are lower fat levels than those recorded in Souk-Ahras (3.7%) by Boumendjel et al. (2017) and for the Arbia goat (5.4%) in the region of Oued-Souf (southeast Algeria) by Matallah et al. (2020). Jenness (1980) showed that there is a high disparity in the composition of goat milk according to geographical origin. Thus, the components of goat milk varies with the seasons and the type of food.

The mean values of total proteins of studied milk in Souk-Ahras and Tebessa were 17.03 vs 9.89%, which is higher than reports by Djouza and Chehma (2018) in Biskra (3.01%) and Arbia in El-Oued (3,80%) but lower than the results of Boumendjel et al. (2017) in local breed goat.

Many factors influence milk composition, and these differences may be genetic (Ciappesoni et al., 2004). Zumbo and Di Rosa (2007) reported an upward trend for fat and protein percentages, both in primiparous and multiparous goats.

We recorded dry extract values varying between 13.22% and 21.35% respectively for the milk goats of Tebessa and Souk-Ahras, and the latter values are higher than the report of 15.8±0.3% for

indigenous breeds goat milk in intensive breeding in the region of Oued-Souf (southeast Algeria) studied by Matallah et al. (2020). The dry extract confirms the high nutritional quality of the milk (Matallah et al., 2020). Jenness (1980) reported that in Mediterranean and tropical areas, low-milk breeds produce milk rich in fat, dry matter, and protein.

The density was estimated at 1.030 vs. 1.035 respectively in Souk-Ahras and Tebessa, which was higher than compared to Arbia goat milk (1.027) analysed by Boumendjel et al. (2017) in Souk-Ahras and similar to Arbia goat milk (1.032) as reported by Djouza and Chehma (2018).

The measured pH values ranged from 7.06 for milk from Souk Ahras to 7.10 for milk from Tebessa ($P>0.05$). These results were slightly higher values than the standard stated by the literature, but similar to reports by Boumendjel et al. (2017). Aroum et al. (2016) stated that the variation in pH is probably due to the diet because pH depends on the nature of the fodder ingested by the animal and the availability of water. According to Boumendjel et al. (2017), pH variability depends on the genetic polymorphism of goat milk proteins. Variations in milk pH can also result from an infection of the animal's udder (Kandeel et al., 2019).

Salt composition was 0.74% in Tebessa versus 0.83 % in goat milk of Souk-Ahras in this study and was significantly different ($P<0.05$). These values are similar to those of the Arbia breed (0.7%) in Biskra and in in intensive breeding system (Djouza and Chehma, 2018; Matallah et al., 2020).

Livestock management and the level and mode of feeding and environmental conditions are the main factors affecting the change in milk production and composition (Boumendjel et al., 2017). The physicochemical characteristics of milk can be affected by litter size (Ciappesoni et al., 2004), stage or time of lactation (Idamokoro et al., 2017), the duration and method of preservation (freezing or otherwise), or processing into milk by-products (O'Connor, 1994).

Similarly, it can be linked to the effect of the season (Kljajevic et al., 2018). El-Gendy et al. (2014) found that udder characteristics (measurements) influence the composition of milk.

The protein/fat ratio in milk was significantly different ($P<0.05$) and measured5.49 in Souk-Ahras versus 2.99 in Tebessa, which was higher than the report by Matallah et al. (2020). According to Hoden and Coulon (1991), the objective sought in France is to produce milk with a total protein/fat ratio as high as possible

**Table 3.** Weight characteristics of local breed kids by area and gender

| Parameters | Total | Area | | Sex | |
|---|---|---|---|---|---|
| | | Souk-Ahras | Tebessa | Male | Female |
| Weight at birth W0 (kg) | 1.80±0.61 | 2.03 ±1.21* | 1.42 ±0.11* | 1.73 ±0.88 | 1.72 ±0.26 |
| Weight at 30 days W1 (kg) | 3.47 ±1.67 | 3.75 ±1.30* | 3.00 ±0.66* | 3.40 ±0.92 | 3.29 ±0.75 |
| Weight at 60 days W2 (kg) | 5.91±1.76 | 6.26 ±1.60* | 5.50 ±0.68* | 6.37 ±1.69* | 5.70 ±1.67* |
| Weight at 90 days (kg) | 10.05±2.02 | 10.40 ±1.90 | 9.45 ±0.55 | 10.80 ±1.74* | 9.49 ±1.96* |

* significant at $P<0.05$

(0.79 on average), i.e., milk with a high protein content but a moderate butterfat content. This is an important parameter and it provides valuable information on the relevance of feeding, particularly with lactogenic plants present on the pastures.

### *Weight and growth rate*

Table 3 shows the mean birth weight and weights at different ages (30, 60, and 90) days of Arbia goat kids by area and sex.

Weight at birth and at 30 days of goat kids was not significantly affected by sex ($P>0.05$), though weight at 60 and 90 days was significantly affected ($P<0.05$) by sex. Mioč et al. (2011) reported that the birth weight of kids is highly variable, and is mostly under the influence of breed. In most cases, it is 1/15 of the body weight of the adult goat. Within the breed, variations of birth weight are conditioned by the type of birth, sex, parity, development and age of doe, length of pregnancy, feeding, kidding season, and health condition (Mioč et al., 2011).

The effect of sex on weight in this study was significant. In particular, male kids of both local breeds had a consistent weight advantage over females at various ages (60 and 90 days). The results agreed with the findings of many previous studies on other goat breeds indicating that male kids were superior to their female counterparts at all stages of growth (Djouza and Chehma, 2018; Sahraoui et al., 2020). Al-Dawood et al. (2020) reported that the growth superiority of male kids to higher weight is due to androgens that play a role in growth, and it may also be because males are more active than females, and may consume more milk and feed.

Birth weight and the weights recorded at 30 and 60 days were significantly affected ($P<0.05$) by area, while weight at 90 days was not ($P>0.05$) (Table 3). He et

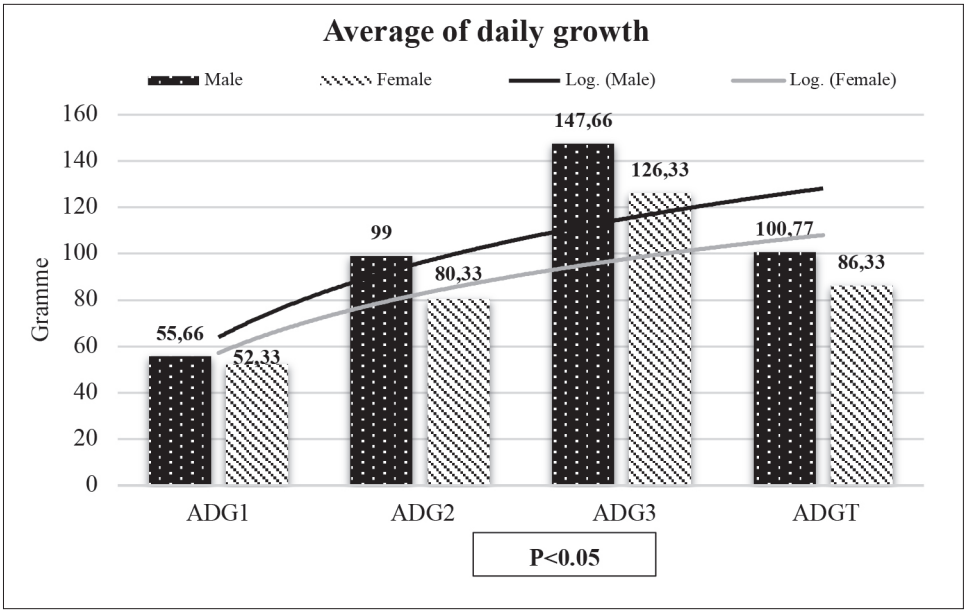


**Figure 1.** Influence of sex on average daily growth (ADG), ADG1: between birth and 30 days, ADG2: between 31 and 60 days, ADG3: between 61 and 90 days ADGT: between birth and 90 days

al. (2013) reported that the goat diets in the final weeks of gestation influence the birth weight as the foetus acquires 75% of its birth weight (Aissaoui et al., 2019). Our findings are similar to the results of Sahraoui et al. (2020). However, other studies found that males were always born heavier than females, and grew faster in Ghana and Indonesia (Hagan et al., 2012; Nugroho et al., 2018).

Figures 1 and 2 show the influence of sex and area on daily growth average (ADG) respectively. Similar results were obtained by Djouza and Chehma (2018) and Sahraoui et al. (2020).

According to the values from Table 3, we calculated the average live weight gains (ADG). The overall ADGs recorded in our study are comparable to the values reported by Djouza and Chehma (2018) for the same breed in an extensive breeding system. In comparison to the average daily weight gain, Boer goat kids gain 200 g daily on average in better feeding conditions during the first twelve months (Mioč et al., 2011). The same author determined an average daily weight gain of 149.7 g and 164.92 g, respectively for Alpine kids and Saanen kids (period from kidding to 102 days of life).

The average daily growth between 31 and 90 days (ADG3), of goat kids was significantly affected ($P<0.05$) by sex (Figure 1). The difference in growth between the sexes lies in conformation and metabolism; according to Al-Dawood et al. (2020), each sex evolved under the control of its endocrine balance.

The average birth weight of kids in the two areas was W0=1.80±0.61 kg, while the average at 90 days was W90=10.05±2.02 kg, corresponding to an overall daily weight gain of ADG0-90 = 91.66 g/day. The overall ADGs recorded in our study are more comparable to the values reported by Djouza and Chehma

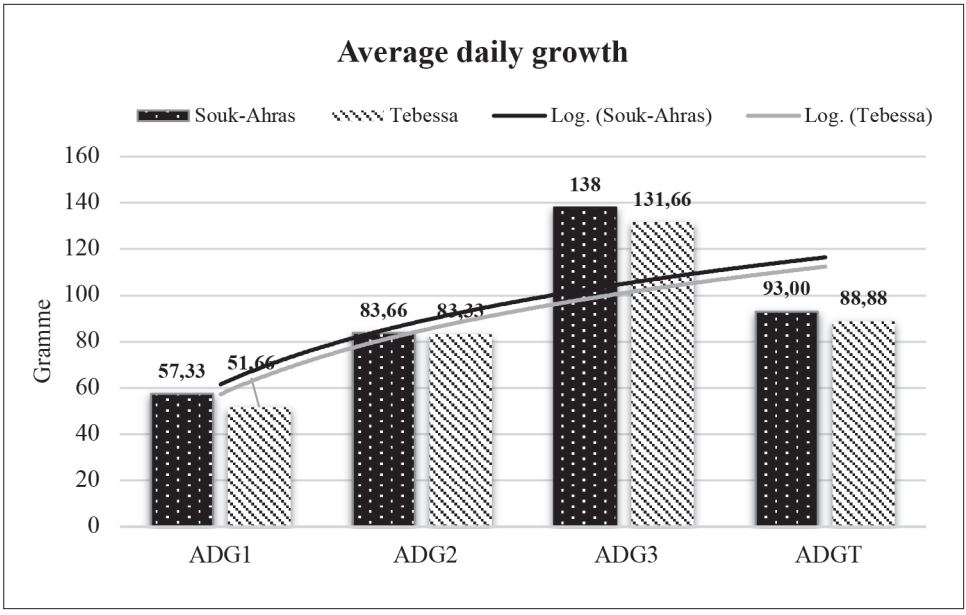


**Figure 2.** Influence of area on average daily growth (ADG), ADG1: between birth and 30 days, ADG2: between 31 and 60 days, ADG3: between 61 and 90 days ADGT: between birth and 90 days

(2018) in low-input systems and lower than the values provided by Sahraoui et al. (2020) for the same breed in high-input systems. Aissaoui et al. (2019) reported that the farming practices of local breeds and breed hardiness led to slower growth. Consequently, for faster growth, a balanced diet is very important for both goats and kids.

Figure 2 shows that the average daily growth from birth to 90 days of goat kids, ADG1, ADG2, and ADG3 was not significantly affected by the area ($P$>0.05). This result may be attributed to the animal's ability to grow despite the environmental influences. Growth is strongly related to mothers' milk production (quality and quantity), especially during the first 40 days (Alexandre, 1991). In this study, the protein/fat ratio in milk was significantly different ($P$<0.05) between areas, and was 5.49 in Souk-Ahras, explaining the higher ADG1 in the first 30 days in Souk-Ahras than in Tebessa.

Tölü et al. (2016) investigated the effects of a structured environment on feed conversion of goats and observed no significant impacts.

Until weaning, the main environmental influences are birth weight, milk supply, health, and available feed. After weaning, the main environmental influences are goat health, and feed quantity and quality. The growth rate can vary significantly, based on these genetic and environmental factors (Notter et al., 1991).

## Conclusions

The results of the goat milk analysis showed that there were significant variations in certain physicochemical parameters of milk depending on the region of Algeria (wilayas of Souk-Ahras and Tebessa). It would be advisable to check for the presence of lactogenic plants in the pastures of these breeders to optimise production. For kids, the birth/30-day ADG makes it possible to estimate the genetic potential of goats and goats on the milk value criterion, and the >30-day control makes it possible to determine the meat performance of goat kids.

## References


1. AISSAOUI, M., K. DEGHNOUCHE, H. H. BOUKHALFA and I. SAIFI (2019): Growth Performance of Goat Local Breed Reared in Southeastern Algeria World J Environ Biosci. 8, 59-66.
2. AL-DAWOOD, A., S. AL-KHAMAISEH and R. M. AL-ATIYAT (2020): A comparative study on the growth rate and survivability of three goat breeds from Jordan, J. Appl. Anim. Res. 48, 331-339. 10.1080/09712119.2020.1791880
3. ALEXANDRE, G. (1991): Croissance pré-sevrage des chevreaux en Guadeloupe. Rev. Elev. Med. Vet. Pays Trop. 44, 57-62. 10.19182/remvt.9232
4. BELANTAR, I., H. TEFIEL and S. B. S. GAOUAR (2018): Phenotypic characterization of local goat population in western Algeria (Wilaya of Relizane) with morphometric measurements and milk analysis. Genet. biodivers. 2, 55-56. 10.46325/gabj.v2i2.123
5. BOUMENDJEL, M., N. FEKNOUS, F. MEKIDECHE, N. DALICHAOUCHE, I. FEKNOUS, L. TOUAFCHIA, N. METALAOUI and R. ZENKI (2017) : Caractérisation du lait de chèvre produit dans la région du Nord-Est Algérien. Essai de fabrication du fromage frais. Alger. J. Nat. Prod. 5, 492-506.
6. CIAPPESONI, G., J. PŘIBYL, M. MILERSKI and V. MAREŠ (2004): Factors affecting goat milk yield and its composition. Czech J. Anim. Sci. 49, 465-473. 10.17221/4333-CJAS
7. DJOUZA, L. and A. CHEHMA (2018): Production characteristics of Arabia goats in Biskra Wilayah, Algeria. Livest. Res. Rural Dev. 30, 113.
8. EL-GENDY, M. E., H. F. H. YOUSSEF, E. O. H. SAIFELNASR, H. A. EL-SANAFAWY and F. E. SABA (2014): Relationship between udder characteristics and each of reproductive performance and milk production and milk composition in Zaraibi and Damascus dairy goats. Egypt. J. Sheep Goat Sci. 9, 95-104
9. FAO (1990): Base de données sur les ressources génétiques mondiales. FAO, Rome. 91-99.
10. FAOSTAT (2018): Statistics of Food and Agriculture Organization of the United Nations. http://www.fao.org/faostat/fr/#data/QA.
11. HAGAN, J. K., S. O. APORI, M. BOSOMPEM, G. ANKOBEA and A. MAWULI (2012): Morphological Characteristics of Indigenous Goats in the Coastal

Savannah and Forest Eco-Zones of Ghana. J. Anim. Sci. Adv. 2, 813-821.
12. HE, Z. X., D. Q. WU, Z. H. SUN, Z. L. TAN, J. Y. QIAO, T. RAN, S. X. TANG, C. S. ZHOU, X. F. HAN, M. WANG, J. H. KANG and K. A. BEAUCHEMIN (2013): Protein or energy restriction during late gestation alters fetal growth and visceral organ mass: evidence of intrauterine programming in goats. Anim. Reprod. Sci. 137, 177-182 10.1016/j.anireprosci.2013.01.005
13. HODEN, A. and J. B. COULON (1991): Maîtrise de la composition du lait: influence des facteurs nutritionnels sur la quantité et les taux de matières grasses et protéiques. INRA Prod. Anim. 4, 361-367. 10.20870/productions-animales.1991.4.5.4349
14. IDAMOKORO, E. M., V. MUCHENJE and P. J. MASIKA (2017): Yield and Milk Composition at Different Stages of Lactation from a Small Herd of Nguni, Boer, and Non-Descript Goats Raised in an Extensive Production System. Sustainability 9, 1000. 10.3390/su9061000
15. JENNESS, R. (1980): Composition and characteristics of goat milk: Review 1968 -1979. J. Dairy Sci. 63, 1605-1630. 10.3168/jds.S0022-0302(80)83125-0
16. KANDEEL, S. A., A. A. MEGAHED, M. H. EBEID and P. D. CONSTABLE (2019): Ability of milk pH to predict s ubclinical mastitis and intramammary infection in quarters from lactating dairy cattle. J. Dairy Sci. 102, 1417-1427. 10.3168/jds.2018-14993
17. KLJAJEVIC, N. V., I. B. TOMASEVIC, Z. N. MILORADOVIC, A. NEDELJKOVIC, J. B. MIOCINOVIC and S. T. JOVANOVIC (2018): Seasonal variations of Saanen goat milk composition and the impact of climatic conditions. J. Food Sci. Technol. 55, 299-303. 10.1007/s13197-017-2938-4
18. LAD, S. S., K. D. APARNATHI, B. MEHTA and S. VELPULA (2017): Goat milk in human nutrition and health - a review. J. Curr. Microbiol. App. Sci. 6, 1781-1792. 10.20546/ijcmas.2017.605.194
19. MATALLAH, S., F. MATALLAH, and T. GADI (2020): Effet de la race sur la composition physico-chimique de laits de chèvres du Sud-Est algérien. Livest. Res. Rural Dev. 32, 148.
20. MILLER, B. A. and C. D. LU (2019): Current status of global dairy goat production: an overview. Asian-Australas. J. Anim. Sci. 32, 1219-1232. 10.5713/ajas.19.0253
21. MIOČ, B., V. SUSIC, Z. ANTUNOVIC, Z. PRPIC, I. VUNCEC and A. KASAP (2011): Study on birth weight and pre-weaning growth of Croatian multicolored goat kids. Vet. arhiv. 81, 339-347.
22. MONTEIRO, A., J. M. COSTA and M. J. LIMA (2017): Goat System Productions: Advantages and Disadvantages to the Animal, Environment and Farmer. In: Kukovics, S. Editor. Goat Science. London: Intech Open; pp. 351-366. 10.5772/intechopen.70002
23. NOTTER, D. R., R. F. KELLY and F. S. MCCLAUGHERTY (1991): Effects of ewe breed and management system on efficiency of lamb production: ll. Lamb growth, survival and carcass characteristics. J. Anim. Sci. 69, 22-33. 10.2527/1991.69122x
24. NOUTFIA, Y., S. ZANTAR, M. IBNELBACHYR, S. ABDELOUAHAB and S. OUNAS (2014): Effect of stage of lactation on the physical and chemical composition of Drâa goat milk. African J. Food Agric. Nutr. Dev. 14, 9181-9191. 10.18697/ajfand.64.11230
25. NUGROHO, T., A. NURHIDAYATI, A. I. AYUNINGTYAS, C. KUSTIYANI, S. PRASTOWO and N. WIDYAS (2018): Birth and weaning weight of kids from different Boer goat crosse: IOP Conf. Ser.: Earth Environ. Sci. 142, 012010. 10.1088/1755-1315/142/1/012010
26. O'CONNOR, D. L. (1994): Folate in goat milk products with reference to other vitamins and minerals: A review. Small Rumin. Res. 14, 143-149. 10.1016/0921-4488(94)90104-X
27. RUIZ-MORALES, F. A., J. M. CASTEL-GENÍS and Y. M. GUERRERO (2019): Status, challenges and the way forward for dairy goat production in Europe. Asian-Australas. J. Anim. Sci. 32, 1256-1265. 10.5713/ajas.19.0327
28. SAHRAOUI, H., T. MADANI, H. BENMAKHLOUF, M. BENSALEM, K. FANTAZI and S. B. S. GAOUAR (2020): Growth of Arbia goat kids in an intensive production system in Setif, Algeria. Rev. Ciênc. Agrovet. 19, 462-467. 10.5965/223811711942020462
29. TÖLÜ, C., S. GÖKTÜRK and T. SAVA (2016): Effects of Weaning and Spatial Enrichment on Behavior of Turkish Saanen Goat Kids. Asian-Australas. J. Anim. Sci. 29, 879-886. 10.5713/ajas.15.0597
30. ZUMBO, A. and R. DI ROSA (2007): Effects of parity and type of kidding on the quantitative and qualitative milk characteristics of the Rossa Mediterranea goats. Ital. J. Anim. Sci. 6, 636. 10.4081/ijas.2007.1s.636

# Proizvodnja mlijeka autohtone arbia pasmina koza i učinkovitost rasta kozlića u Alžiru

Hind HOUSSOU, Institute of Agronomic and Veterinary Sciences, Souk Ahras University, Algeria; Laboratory of Sciences and Techniques of the Living, Souk-Ahras University, Algeria; Abir LABIOD, Aya RAMDANI, Institute of Agronomic and Veterinary Sciences, Souk Ahras University, Algeria; Tarek KHENENOU, Laboratory of Sciences and Techniques of the Living, Souk-Ahras University, Algeria

Poznavanje mogućnosti proizvodnje mlijeka od osnovne je važnosti za uzgoj proizvoda koji će do kraja izraziti svoj genetski potencijal. Ova studija, provedena na sveukupno 94 arbia koza i 65 kozlića; *n*=195; veljača-svibanj 2022. u provincijama Souk-Ahras i Tebessa, omogućila nam je procijeniti potencijal proizvodnje mlijeka ove pasmine s jedne strane te dnevni prirast (ADG) od rođenja do 90. dana starosti s druge strane. Podatci su nas upozorili da je dnevna proizvodnja mlijeka (*n*=94) bila 0,89±0,85 litara na dan. Kvaliteta mlijeka okarakterizirana je prosječnim sastavom od 3,2 % masnoće, 13,46 % ukupno bjelančevina, 17,28 % ukupno suhe tvari, 0,78 % soli, pH vrijednošću od 7,08±0,01, kiselošću od 17,7 °D, gustoćom od 1032 i omjerom bjelančevina/masnoća od 4,29. S obzirom na učinkovitost rasta, prosječna je težina pri porođaju bila W0 = 1,80±0,61kg, dok je prosječna težina na 90. dan bila W90 = 10,05±2,02 kg, što odgovara sveukupnom dnevnom prirastu težine od ADG0-90 = 91,66 g/dan. Studija je pokazala da spol nije utjecao na porođajnu težinu ($P$>0,05). Nakon odbijanja od hranidbe mlijekom su rasli brže ($P$<0,05), a na aspekt učinkovitosti izveden nekim fizičko-kemijskim karakteristikama mlijeka utjecalo je i područje ($P$<0,05). Naša je studija pokazala da je lokalna pasmina koza imala dobru učinkovitost proizvodnje mlijeka te da su kozlići pokazali prihvatljiv potencijal proizvodnje mesa u polu-suhim uvjetima alžirskog okoliša. Bilo bi prikladno provjeriti laktogene biljke koje rastu na pašnjacima uzgajivača s povećanom proizvodnjom.

**Ključne riječi:** *Alžir, koza, mlijeko, proizvodnja, odbijanje od hranidbe mlijekom*