

## **MILK COMPOSITION OF GRAZING AWASSI SHEEP AND BALADI GOATS IN THE MIDDLE AND NORTHERN REGIONS OF JORDAN**

**Safaa, S. El-Ghusien; M. M. Abdelrahman and W. Gazan**

*Department of Animal Production, Faculty of Agriculture and Science, Jerash Private University, Jerash, Jordan*

### **SUMMARY**

*This work was carried out to determine the milk composition of grazing Awassi sheep and Baladi goats in the middle and northern regions of Jordan.*

*Three hundred milk samples were collected from 150 ewes and 150 does from five governorates [Amman, Irbid, Jerash, Mafraq and Zarqa] during April, May and June. The samples were analyzed for major components including fat, protein, lactose, ash and total solids.*

*It was found that the average percentage composition of ewes milk was 6.68, 5.59, 4.25, 1.03 and 18.60 for fat, protein, lactose, ash and total solids respectively, while that for goats the percentage composition was 4.14, 2.99, 3.94, 0.84 and 12.15 for fat, protein, lactose, ash and total solids respectively.*

*A significant governorates effect ( $p < 0.05$ ) on milk composition was found for both Awassi ewes and Baladi does.*

**Keywords:** *Milk, sheep, goats, Jordan region*

### **INTRODUCTION**

Of the total world production of milk, cows produce about 90.8%, sheep 1.7% and goats 1.5%. These three species provide the most significant source of milk for commercial production. Sheep and goats have been used as a source of milk for thousands of years. In areas where climatic conditions prevent cattle from being raised, there is a growing interest in sheep and goats milk. Most of the Mediterranean countries utilize commercially produced sheep milk for the production of special cheese and other products. One of the most significant differences between sheep milk and milk from other species is its compositional quality. The composition of the milk vary according to breeds within the species. Also it depends on the lactation number (parity), feeding practices and animal health. The gross composition of goats' milk is close to that of cows. However, milk from sheep has a much higher fat and protein content (Harding, 1995). Goats' milk has a wide range of milk components (AlKanhal, 1993).

In Jordan, one of the Mediterranean countries, the number of Awassi sheep and Baladi goats has increased during the last ten years (estimated at 2.5 million). They are used as sources of three products: milk, meat and wool. Most sheep and goat

herds that are small and free grazing in natural ranges in all governorates of the Kingdom produced about 29% of the total local milk production (Ministry of Agriculture, 1998).

This work was carried out to determine the major components of milk from grazing Awassi sheep and Baladi goats in middle and northern regions of Jordan. The study aims to have preliminary basic information for inclusive researches in the different fields of milk production. On the other hand such information is of value in improving dairy industry.

## MATERIALS AND METHODS

### Milk Sampling:

Three hundred milk samples were collected randomly from grazing 150 ewes and 150 does spreaded in five governorates [Mafraq (M), Irbid (I), Jerash (J), Zarqa (Z) and Amman (A)] during April, May and June. The samples were analysed for major components including fat, protein, lactose, ash and total solids.

### Chemical analysis:

The technical work for chemical analysis was carried out in the laboratories of the Faculty of Agriculture and Science, Jerash Private University. The milk samples were analyzed for fat by Gerber method, for total protein by Kjeldahl method, alongside total solids and ash content according to Ling (1963). Lactose content was determined colourimetrically according to Barnette and Abd El-Tawab (1959).

### Statistical analysis:

Data were analyzed using standard statistical procedures (Al Nagar and Ghazal, 1982).

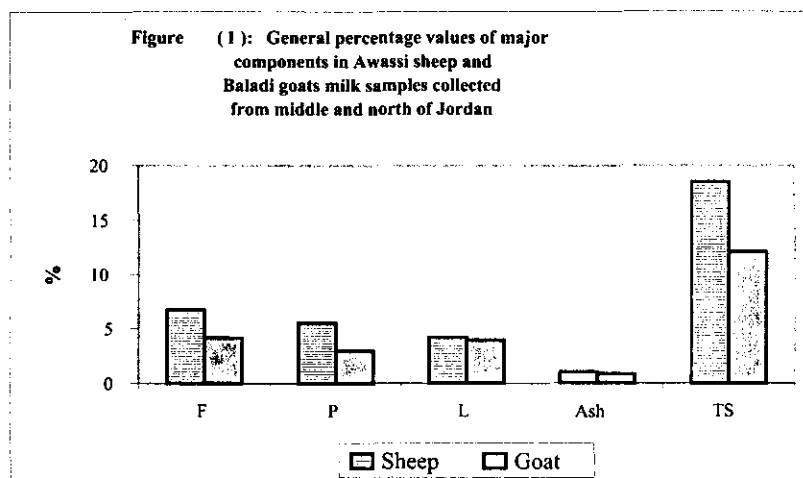
## RESULTS AND DISCUSSION

### General pattern of milk components:

In general Baladi goats milk showed the components percentages as: fat 4.14%, lactose 3.94%, protein 2.99%, ash 0.84% and total solids 12.15%. (Table 1, Fig., 1). These values are similar to that reported by Harding (1995) for UK breeds, Ramos and Jurarey (1993) for Muriciana-Grandia goats and El Alamy *et al.* (1990) for Egyptian breeds. However, the fat content found in the present study is higher than that reported by AlKanhall (1993) for Masri and Ardy breeds. Contrary to that higher fat percentage the protein percentage is lower than that reported by Saway *et al.* (1984).

**Table 1. Overall percentage values of major components in sheep and goats milk samples collected from middle and north of Jordan**

	F	P	L	Ash	TS
Sheep	6.68±2.40	5.59±1.28	4.25±1.57	1.03±0.63	18.60±3.77
Goat	4.14±1.58	2.99±0.59	3.94±0.97	0.84±0.69	12.15±2.31



Awassi sheep milk showed the components percentage as: fat 6.68%, lactose 4.25%, protein 5.59%, ash 1.03% and total solids 18.60%. (Table 1 & Fig. 1). These results are similar to that reported by Harding (1995) for UK breed, Kostas *et al.* (1995) for Karagouniko breed and Jenness (1980) in U.S.A. The fat content and total solids are more than that reported by Mahran *et al.* (1990) and Hamed *et al.* (1993) for Egyptian breeds.

The differences in milk component as reported by various authors, other than that you to species and breeds, may be due to the different conditions during milk production such as; environmental temperature, availability of feed and water, feed type alongside age and stage of lactation in agreement with the interpretation by Alkanhal (1993).

The present results showed significant differences in the percentages of fat (F), lactose (L), protein (P) and total solids (TS) in the sheep milk (Table 2 & Figs. 2-6) between the five governorates, however the differences in ash (ASH) were not significant ( $P < 0.05$ ). Also the results presented in table (3) and figures (2-6) show significant differences in the percentages of the major components of Baladi does milk (F: fat, L: lactose and P: protein) between the governorates, while the differences in ash and total solids were not significant ( $P < 0.05$ ).

The regional (Governorates) environmental conditions varied in the extent of their effect on milk constitution in both species studied. The fat % in sheep milk was the lowest in Marfac region while it was the highest in Zarqa region. It worth notice that the rank of fat % in goats milk was contrary to that of sheep in the two regions. This result indicates species differences in the assimilation of feed stuff in the same region, a case which needs further studies. The wide variation in the fat % values is reflected on the lactose and protein percentages ranks. The significant variations between the governorates in this study are mainly due to pasture condition (feed type). In Mafraq (M) and Zarqa (Z) animals were grazing on poor pasture resulting from low average rainfall during the winter from December to mid of April. As a

consequence, the farmers supplied the animals with concentrate diet mostly composed of barley and wheat bran in addition to straw. In Jerash (J) and Irbid (I), the pasture was richer because of the relatively higher average rainfalls during the winter, which is sufficient to the growth of the pasture. Therefore the animals in those two governorates are grazed mainly on the green natural pasture. In Amman

roughage. Several studies indicated that the variations in milk composition are mainly due to the feed type, environmental temperature, the availability of water and feed, age and stage of lactation (AlKanhah, 1993).

**Table 2. Percentage ( $\bar{X} \pm \text{SE}$ ) of major components in A five governorates**

Governorates	F	L	P	Ash	TS
M	4.81 $\pm$ 0.19 <sup>a</sup>	5.95 $\pm$ 0.30 <sup>a</sup>	5.30 $\pm$ 0.08 <sup>a</sup>	1.06 $\pm$ 0.05	16.97 $\pm$ 0.47 <sup>a</sup>
I	5.32 $\pm$ 0.25 <sup>ab</sup>	4.17 $\pm$ 0.12 <sup>b</sup>	5.14 $\pm$ 0.09 <sup>a</sup>	0.90 $\pm$ 0.04	16.57 $\pm$ 0.56 <sup>a</sup>
J	7.23 $\pm$ 0.41 <sup>c</sup>	3.82 $\pm$ 0.26 <sup>bc</sup>	4.95 $\pm$ 0.12 <sup>a</sup>	1.06 $\pm$ 0.04	19.79 $\pm$ 0.71 <sup>b</sup>
Z	9.30 $\pm$ 0.27 <sup>d</sup>	3.28 $\pm$ 0.08 <sup>cd</sup>	4.63 $\pm$ 0.17 <sup>a</sup>	1.12 $\pm$ 0.19	21.27 $\pm$ 0.45 <sup>bc</sup>
A	7.11 $\pm$ 0.36 <sup>ce</sup>	3.78 $\pm$ 0.18 <sup>cd</sup>	7.61 $\pm$ 0.18 <sup>b</sup>	0.90 $\pm$ 0.03	18.06 $\pm$ 0.54 <sup>ab</sup>

Abc..., values in the same column having the same superscript are not significantly different at  $P < 0.05$

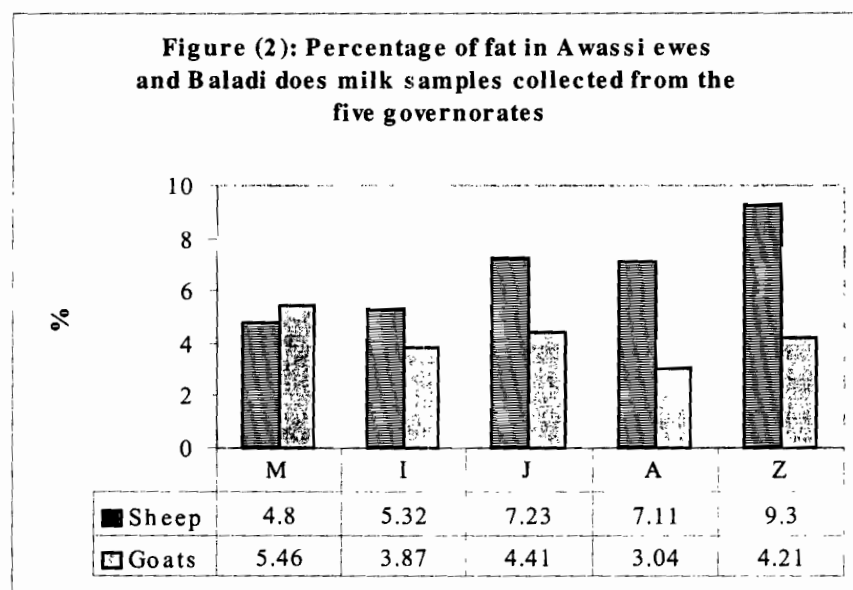


Figure ( 3 ): Percentage of protien in Awassi ewes and Baladi does milk samples collected from the five governorates

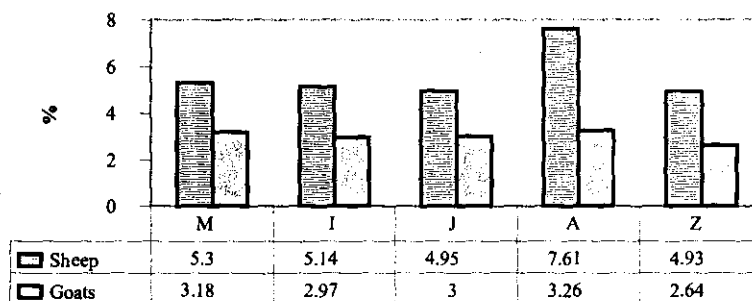


Figure ( 4 ): Percentage of lactose in Awassi ewes and Baladi does milk samples collected from the five governorates

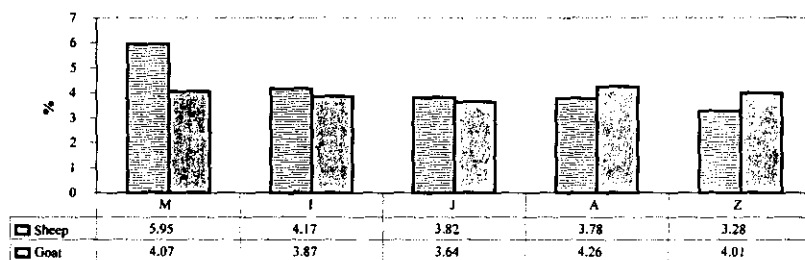
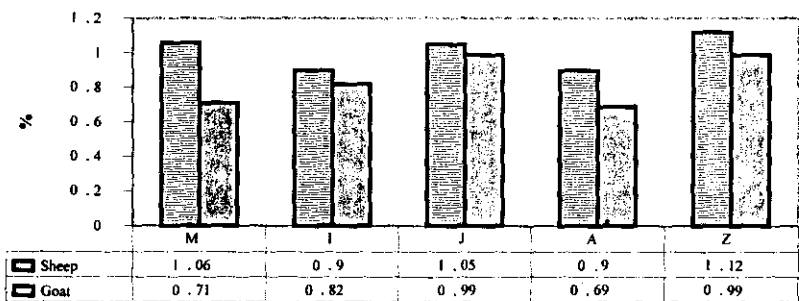


Figure ( 5 ): Percentage of ash in Awassi ewes and Baladi does milk samples collected from the five governorates



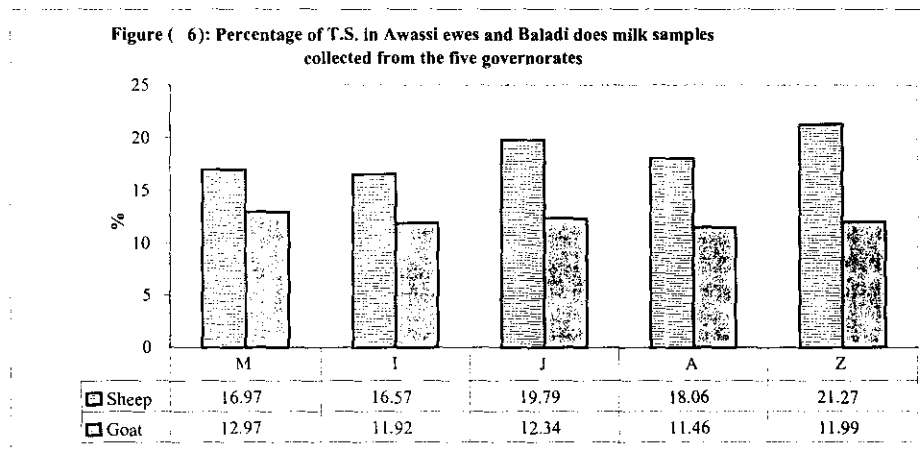


Table 3. Percentage ( $\bar{X} \pm SE$ ) of major components of Baladi does milk in the five governorates

Governorates	F	L	P	Ash	TS
M	5.46±0.48 <sup>a</sup>	4.07±0.18 <sup>ab</sup>	3.18±0.18 <sup>ab</sup>	0.71 ±0.02	12.97 ±0.72
I	3.87±0.29 <sup>b</sup>	3.87±0.18 <sup>ab</sup>	2.97±0.07 <sup>ab</sup>	0.84 ±0.05	11.92 ±0.27
J	4.24±0.22 <sup>cb</sup>	3.64±0.34 <sup>a</sup>	3.00±0.08 <sup>ab</sup>	1.03 ±0.16	12.10 ±0.28
Z	3.04±0.28 <sup>c</sup>	4.26±0.28 <sup>b</sup>	3.26±0.18 <sup>b</sup>	0.69 ±0.04	11.46 ±1.21
A	4.21±0.20 <sup>bcd</sup>	4.01±0.23 <sup>ab</sup>	2.64±0.09 <sup>a</sup>	0.83 ±0.02	11.99 ±0.33

Abc... values in the same column having the same superscript are not significantly different at  $P < 0.05$

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## تركيب الحليب لكل من أغنام العواسي و الماعز البلدي تحت ظروف المرعى الطبيعي في وسط و شمال الأردن

صفاء سعيد الغصين ، معتصم عبد الرحمن ، وليد قازان.

تخصص الإنتاج الحيواني/ قسم العلوم الزراعية ، كلية الزراعة و العلوم ، جامعة جرش الأهلية/جرش-الأردن

يهدف التعرف على تركيب الحليب لأغنام العواسي و الماعز البلدي تحت ظروف المراعي الطبيعية في الأردن .. تم دراسة و تحليل ٣٠٠ عينة حليب ( ١٥٠ نعاج و ١٥٠ ماعز ) أخذت عشوائيا من قطعان رعوية منتشرة في خمس محافظات من وسط و شمال المملكة (المفرق ، اربد، جرش، عمان، الزرقاء) خلال أشهر إبريل ، مايو ، يونيو سنة ٢٠٠٠ .

أجريت التحاليل اللازمة على العينات و تم تقدير النسب المئوية لكل من الدهن، البروتين، اللاكتوز، الرماد و الجوامد الكلية في كل عينة .

أظهرت نتائج الدراسة بأن متوسط هذه النسب في حليب أغنام العواسي كانت ٦,٦٨ ، ٥,٥٩ ، ٤,٢٥ ، ١,٠٣ ، ١٨,٦٠ لكل من الدهن، البروتين، اللاكتوز، الرماد و الجوامد الكلية على الترتيب .

بينما كانت في حليب الماعز البلدي ٤,١٤ ، ٢,٩٩ ، ٣,٩٤ ، ٠,٨٤ ، ١٢,١٥ لكل من الدهن، البروتين، اللاكتوز، الرماد و الجوامد الكلية على الترتيب .

كما أظهرت النتائج فروق معنوية على مستوى ( $p<0.05$ ) بين المحافظات الخمس لكل من النعاج العواسي و الماعز البلدي .