Sheep Production on Natural Pasture by Roaming Bedouins in Lebanon

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Highlight: *Studies have been conducted with 2,589 Awasi sheep belonging to nine family groups having an average of 11 members each to investigate the husbandry practices and production of livestock by roving Bedouins in Lebanon. The natural pasture plants grazed by the sheep were identified and analyzed for chemical composition. The growth rate of lambs and the yield and composition of ewe's milk were also determined in a selected sheep population. The study shows that natural pastoral resources contribute significantly to sheep production by the Bedouins. The traditional methods used under the circumstances do not seem to impede the yield of animal product.*

The term *Bedouin* has been derived from the Arabic word *Badawi* which means: "Those who live in the desert." Bedouins are pastoral nomads involved in nonsedentary animal husbandry. They roam seasonally in a cyclical or rhythmatic course in search of pastures and water, with the entire human group accompanying the flocks and herds along winter and summer grazing grounds following more or less fixed routes. The use of land in pastoral nomadism is ecologically acceptable and capable of continuing for centuries without depleting the basic vegetation resources. The marginal land used in this practice is otherwise inaccessible. Intensive grazing, however, can convert this land of low productivity into a completely unproductive area. In terms of land usage, Barth (1960, 1961) finds it a maximizing system for the support of human societies and their flocks. He shows conclusively that the standard of living of Iranian pastoralists is well above that of the sedentary villagers past whose villages they migrate. About 50 million sheep are being raised every year by Bedouins, out of a total of 154 million in the Near Eastern countries consisting of Afghanistan, Iraq, Iran, Syria, Lebanon, and Jordan (Kolding and Kofod, 1970). Methods of animal production practiced by Bedouins are practically unknown to the outer world. Furthermore, studies on the production parameters of Bedouin animal industry are seriously lacking.

The objective of this preliminary study conducted in central Lebanon were: (1) to describe the sheep population raised and the husbandry practices followed by Bedouins; (2) to identify the plants and weeds grazed in natural pastures; (3) to determine the chemical composition of pastures sampled from different natural grazing grounds used by Bedouins; and (4) to investigate growth rate and milk production in Bedouin sheep flocks.

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Methods and Materials

Interview survey

Nine groups of Bedouins roaming in different areas of central Lebanon were interviewed. The average number of members in each group was 11. The total number of sheep owned by these groups was 2,589. A questionnaire was developed to obtain information regarding composition and characteristics of the sheep population, methods of feeding, breeding and management practiced, and livestock products and their economic return. The main subject matter covered in the questionnaire is shown in Table 1. Each group was approached properly, satisfying their tribal customs. After the acquaintance was established, the head of each group, accompanied by his group members, was questioned. Each group was contacted at certain intervals as they moved from place to place during a 5-month period from April to August, 1970. During this period the same questions were repeated more than once, and any disparity in the answer was clarified.

Pasture studies

Samples of plants were collected in plastic bags from different natural pastures used by the Bedouins under study. All samplings were taken while the sheep were grazing. A number of samples were collected from the grazing ground in a particular location. As each Bedouin group moved, the new pastures grazed were also sampled. Some samples contained one plant variety, while others were mixed. After each sample collection, a few intact plants were pressed for preservation for later identification. The remaining portion was dried at 70°C for 24 hours and then ground. A sample of

Table 1. Form showing main subject areas of the questionnaire.

Date:	Camp location:	Next camp location:

1. Name of the tribe
   ("Qabila", "Fakhth", "Aila", "Bayt", etc.)
2. No. of people living together in the camp
   (Adult males, females, children)
3. Total no. of animals
   (Growing lambs, mature rams, and ewes)
4. Breed of sheep
   (Varieties, etc.)
5. Growing lambs
   (Weaning and marketing age/wt, selling price, lamb mortality, stock replacement, etc.)
6. Mature ewes
   (Adult wt, breeding season, no. of pregnant ewes, birth wt, milk yield/lactation, etc.)
7. Milk
   (Daily production and price, marketing problems, etc.)
8. Breeding rams
   (Selection method, time of culling, breeding problems, etc.)
9. Feeding and management
   (Countries roamed, best pasture time, grazing hours, pasture cost, watering problems, other feeds, etc.)
10. Wool
    (Yield/year, price/kg, shearing frequencies, etc.)

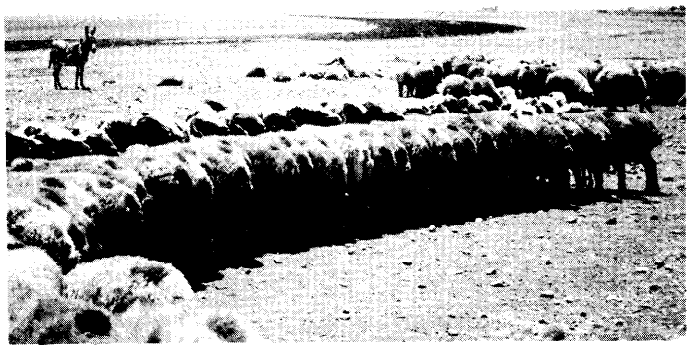

Fig. 1. *A flock of ewes tied face to face in rows for milking.*

Fig. 2. *A flock of sheep at water.*

the ground forage sample was then analyzed for proximate components, including calcium and phosphorus, following the methods outlined by A.O.A.C. (1966).

Sheep production

The growth rate of lambs, their adult weight, and yield and composition of ewe milk were determined in a selected sheep population in the Bedouin flocks. A mobile unit equipped for various measurements visited the Bedouins at intervals during the period of study as the nomads moved from place to place. Daily weight gain of twenty 4-month old lambs selected at random was studied during a 3-month period. About twice that number of lambs were initially included in the growth experiment; but since many lambs, especially the males, were sold during the later part of the experiment, the data were not incorporated. The lambs were ear-tagged at the beginning of the experiment. Body weights of the numbered lambs were recorded approximately every fortnight. The adult weights of 12 rams and 42 ewes were also recorded. Sixteen milking ewes were selected at random and their daily milk yield recorded. Milk samples were also taken for fat and protein determinations.

Results and Discussion

Information regarding husbandry practices and sheep production as obtained from the Bedouins is shown in Table 2. The ewes were bred during the months of June (late) and July, when the number of hours of daylight starts to decline. Thus late summer and a part of winter (Sept. to Jan.), when pasture is scarce, corresponds to the dry period of the ewe flocks. In drought months the ewes are sometimes late in coming to heat. On the average, three breeding rams served each 100 ewes. Approximately 90% of the ewes in the flocks seemed to be pregnant following this natural breeding practice. The average weaning age of lambs ranged between 2 and 4 months, and the weaning age for the entire sheep population studied was 75 days. Lambs kept for breeding purposes were weaned at the upper age range margin. Within 1 month after weaning, almost all the lamb crops were sold at a price comparable to urban market price. The mortality of new-born lambs was about 9%.

After lambing in January, when the pastures are not yet green, the nursing ewe flocks are usually undernourished and the tail fat thins out. Some Bedouin groups practice concentrate-feeding during the winter months, depending upon cost and availability of the concentrates. The best months of pasture seem to be from April to July. Only the ewes in their third or fourth month of lactation and the replacement stock, consisting of female and breeding ram lambs can take advantage of pasture, as most of the ram lambs are sold soon after weaning. If the ram lambs were kept for 3 more months until after the peak pasture period, a higher monetary return could be expected, as will be seen from our growth study.

Table 2. Bedouin husbandry practices and sheep production in nine family camps averaging 11 members per family.

Item	Amount[1]
Total no. of sheep	2589
Percent ewes of total population	67
No. of breeding rams per 100 ewes	3 (2–4)
Months of breeding	June and July
Avg weaning age	75 days (60–120)
Avg marketing age	90 days (75–150)
Price/kg live weight	3 L.L. (2.5–3.5)
Percent lamb mortality	9 (5–11)
Avg lactation period (including nursing period)	250 days
Avg daily milk yield for 150 days (after weaning of lambs)	1.5 lb
Avg price/kg milk[2]	50 L.P.
Months of good pasture	April–July
Avg rental cost for pasture (when paid)	4 L.L./1000 meters[2]
Avg grazing hours per day	10.5 (10–11)
Ingredients of winter feeding	Barley, bran, beet pulp, tibn (straw)
Watering sources	Springs and wells

[1] Range in parentheses for some items.
[2] One dollar (U.S.) = 3.25 L.L. and 1 L.L. = 100 L.P.

The average length of lactation of the ewe flocks was about 8 to 9 months. This could be subdivided into three phases: 1) The first phase comprised 2 to 3 months of nursing after lambing. Most ewes in this phase were fed a concentrate feed mixture and produced an average of 2 pounds of milk per day. 2) The second phase of lactation started when the lambs were weaned and the ewes had access to a good pasture, which continued for a period of 3 months (April to June). The milk production increased, the average yield being 2.5 pounds per day during the whole period. 3) The third phase, covering the following 2 to 3 months (July to September), showed a period of gradual decline in milk production, with the ewes eventually drying at the end of the period. The milk production during this period was about 1 pound a day per sheep.

Thus the average milk production during a 150-day period after weaning of lambs was approximately 1.5 pounds per day. Ewes were milked twice daily (Fig. 1). Some Bedouin groups practice one evening milking, starting at the beginning of the second month of lactation. They keep their lambs with the ewes for half day while removing the lambs from the ewe stock for the remaining half.

It is apparent from the information that at the onset of pasture, even though the ewes are at their third or fourth month of lactation, there is an increase in milk production. Under normal farm feeding conditions the ewes have long passed their peak of lactation by this time. A higher milk production per lactation might be possible if the lactating ewes could take advantage of the pasture

at an earlier time, thereby starting with a higher daily yield. Breeding ewe stock a month or two later might improve the total milk production.

Sheep milk is very popular in Lebanon for the manufacture of various milk products. The price of 0.5 L.L. (15 cents U.S.) per kg of milk sold by Bedouins was comparable to that found in the urban market.

The majority of the Bedouins moved onto the neighbouring country, Syria, during the winter months. Some paid a rent for the grazing ground used, as usually the hilly marginal lands are owned by people and are not government properties. Some Bedouins seeded the pasture before moving on to the next location, usually with barley and vetch. None of the Bedouin groups had any trouble finding sources of water. Available springs and wells were sufficient for watering their sheep (Fig. 2).

The plants identified in the natural pasture included grasses like *Bromus tectorum, Poa annua, and Lolium* sp.; legumes such as *Medicago rigidula, Lathyrus cicera, Trifolium* sp., *Vicia narbonensis,* and *Vicia* sp.; and other species such as *Cardaria daha, Coronilla scorpoides, Galium* sp., *Geranium dissectum, Juncus* sp., *Lampocarpus* sp., *Lupinus pilosus, Metricaria chamomilla, Mentha longifolia,* and *Taraxacum* sp. Some legume plants in Lupinus sp. are sometimes poisonous due to a high content of cyanogenetic glucoside. Plants like *Mentha longifolia* were not only very tough in texture but also had intense aroma. The chemical composition of plant samples collected from various grazing grounds are shown in Table 3. The crude protein content of the pastures on a dry matter basis was generally rather high, the average value being approximately 10%. Even though the crude fiber value was as high as 36% on a dry basis in some samples, the usual values were lower. Calcium and phosphorus contents of the natural pastures were appreciably high. Grazing of sheep in a natural homogeneous pasture of *Mentha longifolia* is shown in Figure 3.

The results of the sheep production study conducted are shown in Table 4. The average daily gain of the month-old lambs during a 3-month period was about 0.42 pounds per day. The growth rate of Awasi lambs recorded in a previous study (Wardeh, 1969) under ideal feeding and farm management conditions was 0.48 pound and 0.39 pound, respectively, for males and females during a period of 120 days after birth. Considering a mixed population with more ewe lambs than ram lambs, the average growth rate obtained by Bedouins is not lower than that obtained under sedentary farm conditions. The reason for a higher proportion of ewe lambs in the final growth data was that the growth record of many ram lambs could not be completed because some of the ram lambs were sold by the Bedouins before the completion of experimental growth period. The adult weights of Awasi rams and ewes were on the upper margin of the range (132-198 pounds for rams and 66-110 pounds for ewes) reported by Mason (1967). The milk yield per day during a period of 3 months after weaning averaged 2.25 pounds with average fat and protein percentages, respectively, of 6.8 and 6.5. The reported yield value for the Awasi breed when fed under ideal conditions is 125 kg for a 150-day period (Mason, 1967); Finci, 1957; Khoury, 1965). The fat content varied greatly within a range of 5.8 to 7.5%, but the fat content of most samples was along the upper margin of the range.

The result of this preliminary study indicates that the Bedouins or semi-Bedouins raising sheep in the natural pasture lands of Lebanon and Syria contribute significantly to the animal industry of the country. The husbandry practices and methods followed, though traditional, are efficient for economic production and protection of sheep. Even though the yield and quality of the produce in this limited study does not seem to be very much lower than that produced under ideal farm conditions, an overall improvement could be expected from modifying certain practices to suit the existing environmental conditions. However, extensive studies should be conducted before any change is recommended.

Table 3. Chemical composition (%) of pastures.

Locality	Sample number[1]	Percent nutrient component (dry basis) Crude Protein	Crude Fiber	Ether ext.	Ash	NFE[2]	Ca	P
Bednayal	1	11.4	13.0	1.9	15.3	58.4	2.77	0.15
Bednayal	2	14.5	18.6	2.3	11.5	53.0	1.74	0.24
Deer Al Ghazal	1	17.1	15.0	1.2	12.4	54.3	1.45	0.35
Deer Al Ghazal	2	15.1	15.6	1.9	14.8	52.9	2.34	0.35
Deer Al Ghazal	2	12.0	25.3	1.9	12.5	48.4	1.56	0.25
Hazzin	1	18.6	15.8	2.3	19.2	44.1	3.45	0.21
Hazzin	2	5.3	36.2	1.1	7.3	50.1	0.50	0.15
Hazzin	3	2.3	22.3	0.7	14.3	60.5	1.25	0.03
Housh Sneid	1	3.9	26.6	0.8	7.3	61.4	0.61	0.10
Housh Sneid	2	8.0	21.2	2.0	6.5	62.3	0.76	0.15
Housh Sneid	3	12.1	17.1	1.1	10.1	59.7	1.94	0.21
Sarain		5.9	32.6	2.1	7.3	52.0	1.12	0.11

[1] Number of sample from particular area.
[2] NFE = Nitrogen free extract.

Table 4. Adult weight, daily gain, milk yield, milk yield, and composition.

Item	Amount
Avg adult wt (lb)	
Breeding ram	180
Ewe	108
Avg daily gain (lb)	0.42
Avg daily milk yield (lb)	2.4
Avg milk fat (%)	6.8
Avg milk protein (%)	6.5

Summary

Studies have been conducted with 2,589 Awasi sheep belonging to nine family groups, averaging 11 members each, to investigate the husbandry practices and problems of livestock production by roving Bedouins in Lebanon. The natural pasture plants grazed by the sheep were identified and analyzed for chemical composition. The growth rate of lambs and the yield and composition of ewe's milk were also determined in a selected sheep population.

The weaning age of lambs ranged from 2 to 4 months. Within 1 month after weaning, the lambs were marketed. The ewes were bred during the months of June and July, and the number of pregnant ewes seemed to be about 90% of the ewe population. After the ewes were milked twice daily for a 4- to 5-month lactation period milk production declined. The average milk yield obtained was 1.5 pounds per day. A majority of the Bedouins included Syrian land along their route of grazing and paid for the pastures they used. Some did seed the pasture and none had any problem of watering their sheep.

A variety of plants made up the forage on the natural pastures. Their chemical composition showed a wide range of

Fig. 3. *A flock of sheep grazing in a natural pasture of* Mentha longifolia.

variation. The ranges of protein and fiber content on a dry matter basis were, respectively, 2.1–19.5% and 11.2–36.2%. The average daily gain of the 24-month old lambs during a 3-month period was 0.42 pound. The average adult weight of the male (breeding ram) and female sheep were 180 and 108 pounds, respectively. The yield of milk per day per ewe during the 3-month post-nursing recording period was 2.4 pounds. The milk fat content ranged from 5.8 to 7.6%, the average being 6.8.

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