

Evaluation of Awassi genotypes for milk production improvement

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Introduction

Awassi is the only sheep breed exploited in Syria by resource-poor farmers to produce lamb meat and sheep milk derivatives highly demanded in the markets. Because of an increasing demand accompanied by promising prices, the production systems are intensifying and shifting towards producing more milk derivatives. Farmers in these systems claim the lack of access to improved animals.

In response to farmers' needs of improved animals, ICARDA initiated in 1999 a genotype comparison by crossing two Awassi genotypes: a line produced at the Al-Kraim breeding plan under the Syrian Ministry of Agriculture in Salamiah and sheep produced at Ceylanpinar program of Turkey. While the first program provided the foundation of ICARDA's experimental flock, a group of Ceylanpinar Turkish animals was also introduced to ICARDA's flock in 1991. This is a report of the milk production performance of the resulting genotypes.

Materials and Methods

- Turkish Awassi (T) and Syrian Awassi (S) rams were mated to S ewes to produce respectively T×S (TS) and S ewes, and the T ewes were mated to T rams to produce T ewes. All ewes were reared at the same conditions at ICARDA's research station in Tel Hadya, Aleppo, Syria. They were supplemented four weeks before lambing and during the lactation with 224 g/ewe/day CP and 18.1 MJ ME/ewe/day if production was 1 kg of milk/ewe/day.
- Control records were taken weekly from weaning (day 56 after lambing) until the end of lactation (when ewes produce ≤ 150 kg). Milk production was accumulated to produce milk yields along lactation lengths. Milk samples collected during control days were analyzed for Protein (P), Fat and Solids-Non-Fat (SNF).
- Ewes with less than 70 kg milk yield were culled in 2003 and 2004. The culling threshold was raised to 100 kg in 2005.
- Linear models including year, age and breed classes, as fixed effects, and dam's lambing weight as a covariate influencing milk yields were used for data analysis. Milk yield and lactation length repeatabilities were estimated by REML with a similar model, including the ewes repeated records in successive years as random effect.

Results

The T ewes had more prolonged milk yields and lactation lengths than TS and S ewes (Figure 1).

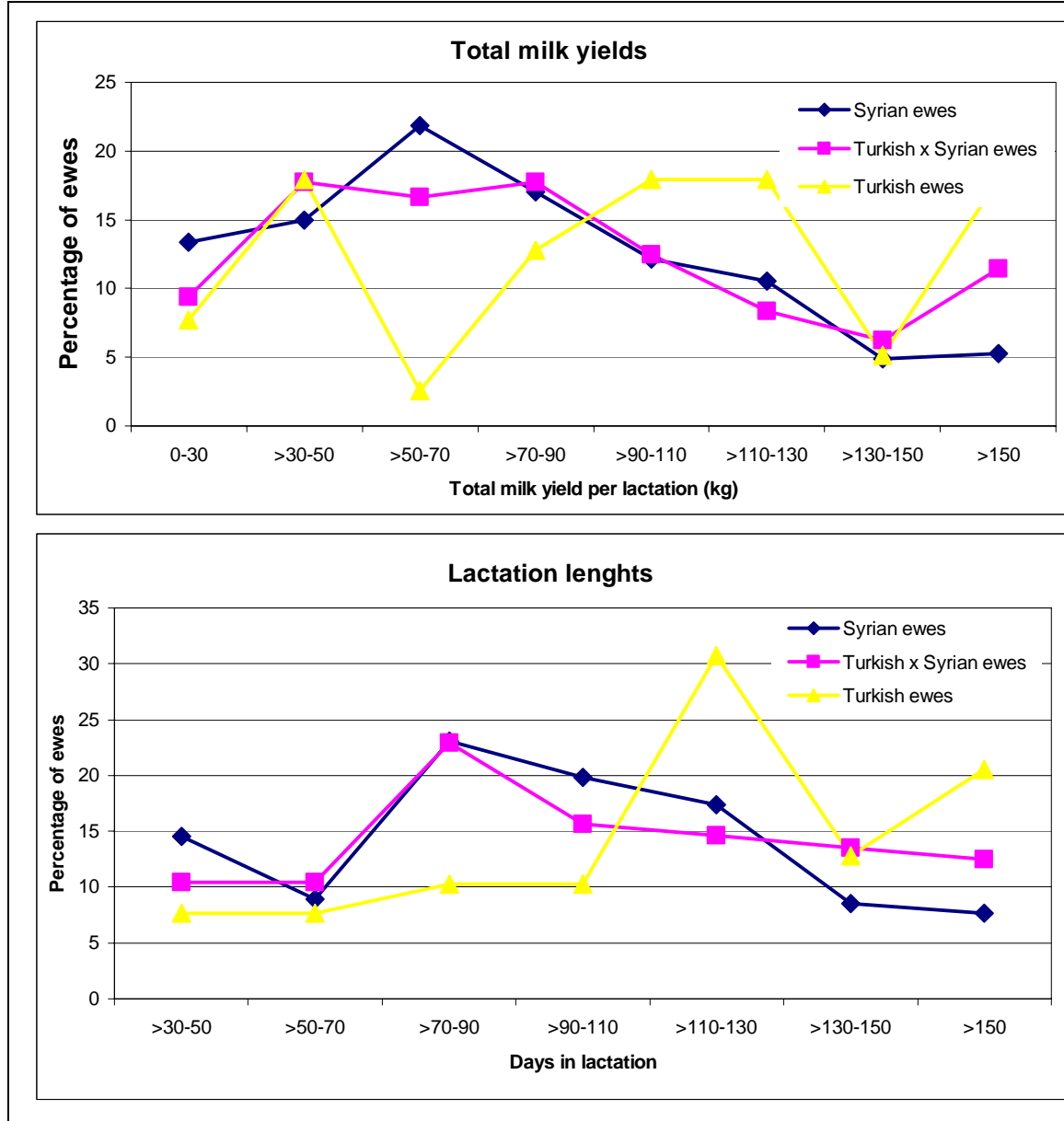


Figure 1. Percentage of different Awassi genotypes producing at different milk yield per lactation and lactation length intervals (2003-2005).

Larger variation was displayed more so in milk yields than in lactation lengths (Table 1). The average milk yields of TS and T ewes were 13% and 30% higher, and the lactation lengths 8% and 23% longer, respectively, than the S ewes. However, only the performance of T animals differed from those of S and TS ($P \leq 0.014$). Assuming that

reciprocal S×T crossed ewes, which we did not produced, would perform the same as T×S ewes, the milk yields and lactation lengths of TS ewes reflected additive inheritance and was not different from the average performance of the parental breeds ($P \geq 0.069$).

In 1991, the milk yield of T ewes in our culled flock was higher than the average of the Ceylanpinar population from which they originated (81.3 kg/ewe/lactation). It was similar to that produced in 1995 by the same flock under selection (136 kg/ewe/lactation) and lower than in 1999 when the breeding plan at Ceylanpinar discontinued. In relation to the performance at Al-Kraim Center from where ICARDA obtained part of its Awassi foundation flock and selected breeding rams in successive periods, the performance of S ewes in our culled flock (109.4 kg) resembled more than the Al-Kraim's unselected control group performance in 1995 (92 kg) than that of Al-Kraim's selected milk line (164 kg). The difference in performance of the Ceylanpinar flock was due to selection, but there was no explanation for the disparity in performance in relation to the Al-Kraim flock.

Milk yields and lactation lengths were substantially enhanced after culling the low producers (Table 1) and the CV reduced by half, indicating a more stable production. The milk yields of S, TS and T ewes, increased by 43%, 38% and 24%, respectively, as a result of culling. There was a 32.9-litter increase in milk production in the S flock. This would translate into 1,645 kg more milk in a typical 50-milking-ewe flock size in milk production areas in Syria. If all the milk would be sold as yogurt, this would be equivalent to US\$987. There would be also an additional increase of 9.6 kg per ewe due to the contribution of T, such that the aggregate value could reach US\$1,275/flock.

Table 1. Average total milk production and lactation length of Syrian Awassi (S), Turkish Awassi (T) and Turkish x Syrian (TS) Awassi ewes.

Genotypes	All culled and non culled ewes					Ewes of culled flock				
	N	Mean [†]	Percent over S	Range	CV %	N	Mean [†]	Percent over S	Range	CV %
<i>Total milk yield (kg)</i>										
S	247	76.5 ^a	100	11-210	54	123	109.4 ^a	100	71-210	30
TS	96	86.1 ^a	113	15-297	60	54	119.2 ^a	109	73-297	38
T	39	99.3 ^a	130	15-233	52	28	123.5 ^b	113	70-233	32
<i>Lactation length (days)</i>										
T	247	94.9 ^a	100	32-193	38	123	121.9 ^a	100	67-193	22
TS	96	102.8 ^a	108	32-228	40	54	127.7 ^a	105	56-228	26
T	39	116.4 ^b	123	35-196	36	28	136.9 ^b	112	91-196	20

[†]Genotype means with different superscripts within a trait differ ($P < 0.01$)

The repeatability estimates for total milk production and lactation length over the three genotypes exhibiting no heterosis in the F1 crosses, were $r=0.5$ and $r=0.49$, respectively ($n=433$).

The percent contents of fat among genotypes did not vary ($P=0.133$) but the protein and SnF contents were different ($P < 0.0001$), however the magnitude of these differences had no practical implications (Figure 2).

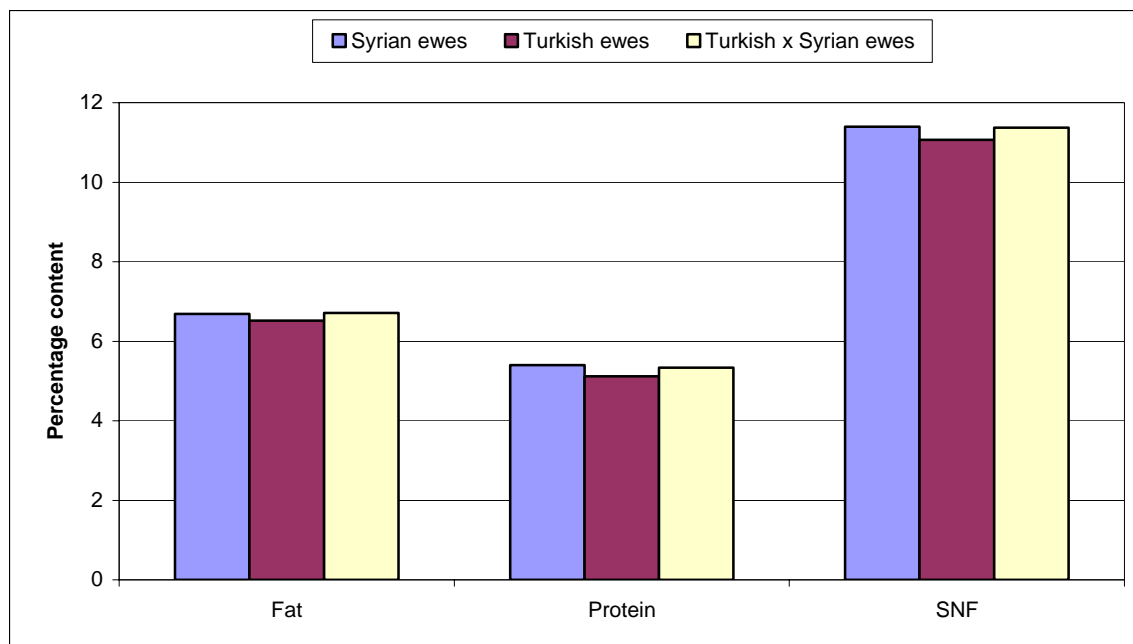


Figure 2. Percentage contents of fat, protein, lactose and SnF in milk of Syrian, Turkish and Syrian x Turkish ewes (2003-2005).

Implications

The Turkish Awassi has the potential to increase the productivity of Syrian ewes by at least 13% in F1 crosses. This genotype could be used as a base for production improvement in areas where feeding conditions have been improved and stabilized.

Up to 43% increase in milk yield can also be achieved by culling unproductive ewes. This and the use of an improved genotype (T) could imply an enhanced value of at least US\$1,200 in a traditional sheep flock in milk producing areas.

These results should be integrated into a sustainable and participatory breeding strategy to target market opportunities and allow farmers to access improved rams.

