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# Effect of two types of supplement to ewes kept on dry pasture

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**SUMMARY -** A herd of 124 South Bulgarian Corideall ewes was divided into two groups and fed 0.25 kg $d^{-1}$ barley only or 0.3 kg $d^{-1}$ concentrate mixture with 221 g $kg^{-1}$ crude protein as supplements to pasture during the relatively dry period of the year. The two groups were equal in live weight, body condition score and daily milk yield. Daily milk yield was recorded every week, and live weight and body condition score every 4 weeks. Three ewes per group were fitted with harnesses and bags for collection of the faeces during 3 consecutive days every 4 weeks. Special meshwork permitted easy drainage of urine from the bags. There was a tendency towards a higher live weight gain, body condition score, daily milk yield and lignin excretion with the faeces (without lignin in supplement) in the ewes receiving concentrate mixture, compared to the barley supplemented group. Milk yield was 10% higher and 8 lambs more were born from the 62 ewes fed concentrate mixture, compared to 62 ewes fed barley supplement. High protein content of concentrate mixture resulted in increased intake of dry grass.

**Key words:** Dry pasture, grazing, supplementation, milk yield, dairy ewes.

***RESUME -*** *"Effet de deux types de supplément sur des brebis menées sur des prairies sèches". Un troupeau de 124 brebis Corideall du Sud de la Bulgarie a été divisé en deux groupes et a reçu 0,25 kg $d^{-1}$ d'orge seulement ou 0,3 kg $d^{-1}$ de mélange de concentré avec 221 g $kg^{-1}$ de protéine brute comme suppléments au pâturage pendant la période de l'année relativement sèche. Les deux groupes étaient égaux pour le poids vif, la note d'état corporel et le rendement laitier journalier. Le rendement laitier journalier était enregistré toutes les semaines, et le poids vif et note d'état corporel toutes les 4 semaines. Trois brebis par groupe étaient munies de harnais et de sachets pour la collecte des faeces pendant 3 jours de suite toutes les 4 semaines. Un maillage spécial permettait un drainage facile de l'urine à partir des sachets. Il y avait une tendance vers un meilleur gain de poids vif, de note d'état corporel, de rendement laitier journalier et d'excrétion de lignine avec les faeces (sans lignine dans le supplément) chez les brebis recevant du mélange de concentré, comparées au groupe avec supplément d'orge. Le rendement laitier était supérieur de 10% avec naissance de 8 agneaux de plus à partir des 62 brebis recevant le mélange de concentré, comparées aux 62 brebis recevant le supplément d'orge. La forte teneur en protéine du mélange de concentré a donné une augmentation de l'ingestion d'herbe sèche.*

***Mots-clés :*** *Prairie sèche, pâturage, supplémentation, rendement laitier, brebis laitières.*

## Introduction

Most of pastures in Bulgaria are public (and never taken care of) dry hills covered with grass, a few legumes (below 5% of total herbage) and low shrubs. Grass growing is intensive during the wet spring months (April, May and part of June). Thereafter during the dry season grass dries up and growth is very limited. Regardless of low protein and mineral content of dry grass it is a common practice to supplement ewes with barley during the dry summer season. However, it is not clear if the energy or protein is the first limiting factor. It is known that level of protein is an important factor limiting intake and digestibility (Grovum, 1987; Paterson *et al.*, 1994). Mineral deficiency could also affect digestibility and intake (Todorov *et al.*, 1983).

The aim of this study was to compare two types of supplements, barley *vs* high protein concentrate mixture for lactating ewes, kept on dry pasture.

## Materials and methods

### Animals and supplementation

The experiment was carried out with a herd of 124 ewes of the South Bulgarian Corideall lambing in January-February. After weaning of the lambs at about two months age, ewes were milked by hand until September, 30.

Experiment started on June 6 and continued until November, 20. Before beginning of the experiment the ewes were weighed out, body condition and milk yield were measured individually in two consecutive days. On the basis of those data ewes were divided into two groups equal by live weight, body condition score and daily milk yield. During the experiment, as well as before and after it, all ewes were kept in one herd. They were separated into two groups only during feeding the supplements. Using a sort gate during milking, ewes were sent to two feeding pens. Similar procedure was used after drying off. For convenience ewes from the of barley group were marked with dye on the wool. Supplements were given twice a day during the period of daily milkings (until September, 16) and once a day later on.

The first group of 62 ewes was supplemented with 0.25 kg $d^{-1}$ barley, while the second group of 62 ewes received 0.3 kg $d^{-1}$ concentrate mixture with 221 g $kg^{-1}$ crude protein (Table 1). All ewes had free access to salt blocks and water. They obtained no other feed except pasture and the experimental supplements. The experiment was terminated on including maize silage into the ration and ewes were gradually adjusted to the winter type of feeding.

Table 1. Net energy and nutrient content of barley and the concentrate mixture (CM)

| Item | Barley | CM† |
|---|---|---|
| One kg of supplement contained | | |
| Dry matter (g) | 872 | 879 |
| Crude protein (N x 6.25) (g) | 106 | 221 |
| Feed units for milk†† | 1.17 | 0.96 |
| Protein digestible in intestine†† (g) | 83 | 114 |
| Balance of protein in rumen†† (g) | -20 | 57 |
| Permanganate lignin (g) | 20 | 37 |
| Daily intake | | |
| Supplement (kg) | 0.25 | 0.30 |
| Feed units for milk†† | 0.29 | 0.29 |
| Crude protein (g) | 26.5 | 66.3 |
| Calcium (g) | 0.2 | 0.57 |
| Phosphorus (g) | 0.88 | 2.00 |

†The concentrate mixture contained: 400 g of dehydrated brewers grain, 260 g of wheat bran, 100 g of sunflower oil meal, 200 g of maize, 20 g of urea, 15 g of salt and 5 g of micro mineral premix (supplying 40 mg of Fe, 11 mg of Cu, 28 mg of Zn, 29 mg of Mn, 1.5 mg of Co, 0.75 mg of I per 1 kg of supplement)

††According the Bulgarian feed evaluation system (Todorov *et al.,* 1995) one feed unit for milk is equivalent to 6 MJ net energy in lactating ruminants or 0.829 UFL according to the French energy system (Jarrige, 1989)

### Measurements

Once a week daily milk yield was recorded individually for each of the two daily milking. Live weight and body condition scoring were estimated every 4 weeks. Five point body condition scoring system was applied (Todorov *et al.,* 1994). Three ewes per group were fitted with harnesses and

bags (sleeves) for collection of the faeces during 3 consecutive days every 4 weeks. Collection bags were made of tissue lined up with polythene. Plastic bowls were tied at the lower ends of the bags. The meshwork bottom of bowls permitted easy drainage of urine. Faeces were taken from bags twice a day, weighed out, dried at 60ºC, ground to pass through 1 mm screen, and analysed for permanganate lignin according to Georing and van Soest (1970). Supplements were analysed by the Weende methods (AOAC, 1980) and for permanganate lignin (Georing and van Soest, 1970).

### Statistical analysis

Group means were compared by t test (Stat Soft Inc., 1994).

## Results and discussion

There was a tendency towards increasing the live weight gain, body condition scores, daily milk yield and lignin excretion with faeces (corrected for lignin in supplement) in ewes fed high protein concentrate mixture, compared to ewes supplemented with barley (Table 2). However during August only milk yield was significantly higher ($P<0.05$) in the concentrate mixture group, than in the barley group. Total milk yield per ewe during the whole experimental period was 80.3 kg for the barley group *vs* 88.2 kg for the concentrate mixture group ($P<0.05$). In the concentrate-mixture group one ewe was barren, 40 ewes born single and 21 ewes-born twins. For barley group figures were 0, 48 and 14, respectively. Fertility rate calculated for 100 ewes was 132.3 for the concentrate mixture group and 122.6 for the barley supplemented group.

Table 2. Live weight (LW), body condition score (BCS), daily milk yield (DMY), and daily lignin excretion (DLE) of the experimental ewes

| Groups | Before experiment | Experimental periods (month) | | | | | |
|---|---|---|---|---|---|---|---|
| | (May) | 1 (June) | 2 (July) | 3 (August) | 4 (Sept.) | 5 (Oct.) | 6 (Nov.) |
| Barley group | | | | | | | |
| LW (kg) | 52.2 | 52.3 | 51.1 | 50.4 | 51.5 | 53.0 | 54.1 |
| BCS | 2.7 | 2.7 | 2.6 | 2.5 | 2.6 | 2.8 | 3.0 |
| DMY (kg) | 1.24 | 1.09 | 0.83 | 0.57 | 0.38 | 0 | 0 |
| DLE† (g) | | 7.64 | 7.80 | 7.72 | 7.78 | 7.83 | 7.84 |
| Concentrate mixture group | | | | | | | |
| LW (kg) | 52.1 | 51.9 | 52.2 | 52.8 | 53.2 | 54.4 | 56.7 |
| BCS | 2.7 | 2.7 | 2.7 | 2.8 | 2.9 | 2.9 | 3.2 |
| DMY (kg $d^{-1}$) | 1.24 | 1.1 | 0.91 | 0.68* | 0.46 | 0 | 0 |
| DLE† (g) | | 7.70 | 7.74 | 8.04 | 8.25 | 8.37 | 8.52* |

†DLE without lignin in supplements
*Difference between groups is significant at $P<0.05$

Differences in group daily milk yield, body condition score and lignin excretion increased with the advance in stage of vegetation, especially during autumn when ewes are grazing mainly the remains of dry grass and browsing brushes. There are two possibilities for the larger lignin excretion in the concentrate-mixture group: (i) increased intake of grass dry matter or (ii) increased intake of low quality grasses of higher lignin content at the same level of dry matter intake as in barley group. Most probably there was an increase in dry matter intake. It is well documented that high level of protein in the diet increased digestibility and as a consequence intake in sheep and goats (Milford and Minson, 1966; Grovum, 1987; Badamana and Sutton, 1992; Paterson *et al.,* 1994).

Protein deficiency reduces the activity of the rumen microflora and thus the rate of digestion and passage (Forbes, 1995, p. 232). However, Egan (1965) found out that protein supply to the organism of sheep effects intake, too. A deficiency or excess of essential minerals could result in reduced feed intake (Forbes, 1995, p. 238). In this experiment it was difficult to distinguish the effects of rumen undegradable and rumen degradable protein, as well as effect of minerals in the concentrate mixture.

## Conclusion

Replacement of barley for high protein concentrate-mixture of equal net energy as a supplement for dry pasture had favourable effect on live weight gain, milk production and fertility of the ewes. Intake of dry grass increased with high protein supplementation.

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