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5- SUMMARY AND CONCLUSION

Effect of protected and unprotected fat on productive and reproductive performance of sheep.

The present study was carried out at Sids Research Station, Belonging to sheep and goats Research Department, Animal Production Research Institute, Agricultural Research Center, Ministry of Agricultural and Land Reclamation in cooperation with Animal production Department, Faculty of Agriculture, El-Minia University during the period from July 2003 to October 2004.

This study included three experiments:

- (1) Effect of protected and unprotected fat supplementation on nutrients digestibility and nutritive values.
- (2) Effect of protected and unprotected fat supplementation as well as flushing on reproductive performance of Ossimi ewes.
- (3) Effect of protected and unprotected fat supplementation on productive performance.

First experiment:

Effect of protected and unprotected fat on nutrients digestibility and nutritive values.

Eighteen healthy adult Ossimi rams were kept in metabolic cages for 15 day preliminary periods followed 7 day for total fecal collection period. Daily feed intake was recorded and feces were quantitatively collected. Representative samples of feeds and feces outputs were taken during the collection period, dried and grinded, then kept in tight bottles until proximate chemical analysis. The digestibility coefficients and nutritive value of berseem hay (BH) was determined directly when fed alone to the experimental animals. However, those of concentrate feed mixture with or without two levels (40 and 60g) protected or unprotected fat were determined indirectly when each was fed with berseem hay

The results can be summarized as follows:

- 1- Added 40 and 60 g protected or unprotected fat led to increased EE% content and decreased CF% content in T3, T2, T5 and T4 (6.90, 7.00, 8.93 and 9.09 % of EE & 17.5, 17.3, 17.2 and 17.25 % of CF respectively) compared with T1, control (3.42 % of EE and 17.58% of CF).
- 2- Added 40 and 60 g protected or unprotected fat led to increase digestion coefficients and nutritive values (TDN, DCP, DE and ME) compared with control.

The present results indicated that fat supplementation with 60g protected or unprotected fat were more efficient than fat supplementation with 40g protected or unprotected fat. Therefore this level (60g) was used in the following experiments.

Second experiment:

Effect of protected and unprotected fat supplementation as well as flushing on reproductive performance of Ossimi ewes.

Reproductive performance experiment was conducted on Ossimi ewes to investigate the effect of flushing and fat supplementation (protected and unprotected) during pre-mating and mating periods on some reproductive performance of ewes.

A. Animals and experimental procedures:

Forty Ossimi ewes were divided according to live body weight and parity season into four groups (10 ewes / each).

Ewes of the four groups were fed as follows:

- 1- Ewes in the 1st group (T1) received only 100% of the NRC, (1985) nutrient allowances (non-flushing) without fats for two weeks before mating as well as the first three weeks of the mating season.
- 2- Ewes in the 2nd group (T2) received supplementary feed equal to 20 % of the NRC, (1985) nutrient allowances (flushing) without fats for two weeks before

- mating as well as the first three weeks of the mating season.
- 3- Ewes in the 3rd group (T3) received supplementary feed equal to 20 % of the NRC, (1985) nutrient allowances (flushing) with added unprotected fat (60g) for to weeks before mating as well as the first three weeks of the mating season.
 - 4- Ewes in the 4th group (T4) received supplementary feed equal to 20 % of the NRC, (1985) nutrient allowances (flushing) with added protected fat (60g) for to weeks before mating as well as the first three weeks of the mating season.

B. Criteria measured:

Oestrous detection, conception rate, litter size, number of services/ conception and gestation period.

The results can be summerized as follows:

- 1- The fertility was improved by flushing with protected or unprotected fat (100 and 90% respectively) compared to flushing without fat (60%) and not flushing (50%).
- 2- Litter size was significantly higher for flushed ewes with protected or unprotected fat (1.3 and 1.2 lamb/ewe) compared with flushed or unflushed ewes without fat (0.9 and 0.5 lamb/ewe, respectively).
- 3- Twinning rate tended to be similar between flushed ewes with or without fat (30%), however these were greater than unflushed ewes (0.0 %).
- 4- No significant difference was found among all treatments in number of services/ conception and gestation period.
- 5- Flushed ewes with or without fat were the heaviest at the end of flushing period compared with the control (ewes without flushing).
- 6- Flushed ewes showed significant increase in DM, TDN and DCP intake during mating period compared with control ewes.

Third experiment:

Effect of protected and unprotected fat supplementation on productive performance.

1: Ewes performance:

A. Animals and experimental procedures:

Available 24 nursing ewes were used in these experiment divided into 3 groups (8 ewes per / each treatment). Ewes after parturition till end lactating period were fed as follows:

- 1- Ewes in T1 were received the standard feeding level 100% of NRC, 1985.
- 2- Ewes in T2 were received the standard feeding level 100% of NRC, 1985, plus 60g unprotected fat.
- 3- Ewes in T3 were received the standard feeding level 100% of NRC, 1985, plus 60g protected fat.

B. Criteria measured:

Milk yield, 7% fat corrected milk, milk fat, feed intake and feed conversion.

All ewes in this experiment had one suckling lamb.

The results can be summerized as follows:

- 1- Milk production expressed as actual milk yield and 7% fat contented were significantly higher for ewes fed protected or unprotected fat compared with those fed control ration.
- 2- Fat % was significantly higher for untreated ewes (T1) compared with treated ewes (T2 and T3).
- 3- Not significant differences between all treatments in DM intake, while those fed protected and unprotected fat supplementation led to greater TDN and DCP intake than control ewes.
- 4- Added protected and unprotected fat led to significantly better feed conversion, DM /kg growth compared with control ewes (T1) without fat.

While TDN and DCP conversion were not significantly differed between all treatments.

2: Suckling lambs performance.

A. Animals and experimental procedures:

24 Suckling lambs (8 lambs 4 male + 4 female per/ each treatment) were weighed at lambing as birth weight then weekly until early weaning weight at 60 days of age. Lambs were weighed before morning suckling at 8 a.m.

B. Criteria measured:

Birth weight, weaning weight, average daily gain and total gain.

The results can be summerized as follows:

Weaning weight, total gain and average daily gain were significantly higher for lambs produced from ewes fed protected or unprotected fat (T2 and T3) compared with the control (T1).

3: Weaned lambs performance:

A. Animals and experimental procedures:

Thirty Ossimi weaned lambs were used in this experiment. Lambs were divided into three similar groups according to their body weight. Each group included 10 lambs (5 males and 5 females).

Lambs of each group were loose-housed in semi-open yards. Minerals and vitamins were supplemented in the form of blocks (Biomix-333). Feed allowances were offered twice daily at 8 a.m. and 4 p.m. Drinking water was available twice daily throughout the experimental periods.

Lambs of the three groups were fed as follows:

- 1- Lambs in the 1st group (T1) received only 100% as DM of the NRC, (1985) nutrient allowances as 50% concentrate feed mixture + 50% berseem hay without fat supplementation during the experimental period.
- 2- Ewes in the 2nd group (T2) received only 100% as DM of the NRC, (1985) nutrient allowances as 50% concentrate feed mixture + 50% berseem hay

with 60g unprotected fat supplementation during the experimental period.

- 3- Ewes in the 3rd group (T3) received only 100% as DM of the NRC, (1985) nutrient allowances as 50% concentrate feed mixture + 50% berseem hay with 60g protected fat supplementation during the experimental period (153 days).

Drinking water was available twice at 10 a.m. and 5 p.m. daily throughout the experimental period.

B. Criteria measured:

Live body weight, feed conversion and economic evaluation.

Lambs were weighed at 3 months age then biweekly until marketing weight (35-45kg). Lambs were weighed before morning feeding at 8 a.m.

Total gain = Final weight–Initial weight.

The results can be summerized as follows:

- 1- DM and DCP intake were not significant different between all treatments but TDN intake was significantly higher for lambs fed protected or unprotected fat compared with lambs fed control ration.
- 2- DM and DCP conversion were improved significantly for lambs fed fat than lambs fed control ration. While no significant difference was found in TDN conversion ratio among all treatments.
- 3- Economic efficiency was better for lambs fed fat compared with lambs fed control ration.

- 4- Economic efficiency and feed conversion were improved for males than females. While no significant difference in feed intake was recorded.
- 5- Lambs fed protected or unprotected fat were significantly greater of total gain and average daily gain than those fed control ration.

4: Rumen fermentation and some blood parameters:

At the end of growth trail, samples were taken from three males in each group. Liquor Samples were collected (using a stomach tube) before feeding, then at 2 and 4 hours after feeding. Rumen liquor samples were filtered through four layers of cheesecloth, then the filtrated portion was used immediately for the measurement of pH. Few drops of saturated solution of mercury chloride was added to the filtrate portion to stop microbial activity before they were frozen. Then the samples was kept for analysis of ammonia–N concentration and volatile fatty acids concentration and fractionation.

Blood samples were taken in heparainized glass tube before feeding at the end of growing experimental period by puncturing the jugular vein. Blood samples were immediately centrifuged at 3000 (R.P.M.), for 20min. Plasma samples were immediately stored at (-20° C) for measuring the concentrations of total plasma protein, phosphor, calcium, glucose, triglycerides, cholesterol and total lipids.

The results can be summerized as follows:

- 1- Ruminal pH values were not significantly differed among all treatments, while NH₃-N and TVFA's were decreased with added protected or unprotected fat than control.
- 2- Ruminal pH values were higher befor feding while NH₃-N and TVFA's concentration were higher at 2 hrs post-feeding.
- 3- Acetic acid was decreased significantly with fat supplementation than control.
- 4- Propionic was higher for lambs fed protected and unprotected fat than those fed control ration.

- 5- Treated lambs by protected or unprotected fat gave significant increase in triglyceride, cholesterol and total lipids compared untreated lambs.
- 6- Treated lambs by protected or unprotected fat gave significant increase in glucose concentrations compared with untreated lambs.

From the presented results it could be concluded that fat supplementation (protected or unprotected fat) with 40 or 60 g led to improvement in the digestibility coefficients and nutritive values of rations fed by sheep. Fat supplementation with 60g protected or unprotected fat were more efficient than 40g. Also, the present results revealed that fat supplementation to the rations, especially protected fat and flushing improved the reproductive performance (oestrous detection, conception rate, litter size and number of services / conception). The results indicated that fat supplementation (protected or unprotected fat) in the rations led to significantly improve of productive performance (milk yield, fat corrected milk, milk fat, feed intake, feed conversion, weaning weight, average daily gain and total gain) in ewes and lambs during suckling period and also, productive performance as live body weight, feed conversion and economic evaluation of weaned lambs during growing period.

Fat supplementation had no adverse effect on sheep healthy, but had induced some changes in the rumen fermentation end product concentration and some blood metabolites.