Fayoum University
Faculty of Agriculture

EFFECT OF USING FIBROLYTIC ENZYMES IN THE RATION ON LACTATING GOATS PERFORMANCE

By

Gamal Ahmed Mousa Abd El-Aziz

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5. SUMMARY AND CONCLUSION

The present study was carried out at farm and laboratory of Animal Production Department- Faculty of Agriculture, Fayoum University while, cellulase production trials and microbiological analyses were carried out at the laboratories of Dairy Science Department, National Research Centre (NRC)، Dokki, Giza, Egypt.

The objective of this study was to produce cellulase enzyme under the optimum conditions and evaluated its potential activity compared to commercial cellulolytic enzyme source. Also to investigate the impact of adding these enzymes to lactating goats ration on nutrients digestibility, milk yield and composition, feed conversion and some blood parameters were conducted .Also, simple economical evaluation of the tested rations was considered.

This study was carried out at two stages:

1. The first stage [Laboratory trials]

a. Culture conditions for cellulase production

Cellulase enzyme was produced by ***Asperigillus niger, Asperigillus flavus, Asperigillus fugimatus, Trichoderma viride and Penicillium chrysogenum***. These fungi were grown as cultures in 250 ml conical flasks containing 50 ml of cellulose powder medium for screening their ability for utilizing rice straw as main carbon source for cellulase production.

b. *In vitro* DM and OM disappearance:

The *In vitro* dry matter and organic matter degradation (IVDMD and IVOMD) respectively for the tested rations **were determined.** The tested rations consisted of 50% concentrate mixture, 25% Egyptian clover and 25 % wheat straw.Locally produced cellulase enzyme (Asperozym) or commercial one (Phytabex plus®) were added to the tested rations at levels of (0 , 500, 1000, 1500 and 2000 U / kg DM).

2. The second stage [Farm trials]:

Nine of lactating baladi goats (in their 2^{th} to 4^{th} lactation seasons and weighed 20 ± 1 **kg in average. Animals were randomly assigned into three groups after 20 days of parturition,** three animals per each tested ration (R) using complete randomized design. **The first group was fed on ration of 50% concentrate feed mixture (CFM), 10% Egyptian clover and 40% wheat straw (control ration). The second group was fed control ration supplemented with Asperozym at 1000 unit of cellulase enzyme/kg DM (R_1), while the third group was fed control ration supplemented with Phytabex plus (commercial enzyme) at 1000 unit of cellulase enzyme /kg DM (R_2). The impact of adding these enzymes on lactating goats performance were studied .**

The obtained results revealed that:-

A- Culture conditions for cellulase production:-

1- ***Asperigillus niger*** **exhibited the highest cellulase** activity reached 0.44 U/ml; therefore it was selected for production of laboratory cellulase enzyme (Asperozym) under the optimum fermentation conditions.

2- The maximum production of cellulase enzyme by *A.niger* was achieved at inoculum ratio of 4% (V/V) was 0.48 U/ml, initial pH 6.0 was 0.45 U/ml, peptone as a nitrogen sources at a concentration of 0.33 g N/l achived 0.79 U/ml and rice straw as a carbon source at a concentration of 10 % (W/V) to give 0.67 U/ml.

B- The *in vitro* trial:-

1. All levels of Asperozym and Phytabex plus® supplementation significantly ($P \leq 0.05$) increased DM and OM disappearance compared to control ration

2. Increasing the Asperozym and Phytabex plus® supplementation levels up to 1000 unit of cellulase enzyme /kg DM gave the highest values of both IVDMD and IVOMD.

C-The *in vivo* trial:-

1- Apparent nutrient digestibility coeffients:-

Rations supplemented with Asperozym (R_1) and Phytabex plus® (R_2) significantly ($P \leq 0.05$) increased DM, OM and CF digestibilities compared to the control ration. No significant differences were detected with CP and EE

digestibility regarding between the tested rations. Ration supplemented with Asperozym (R_1) was superior significantly ($P \leq 0.05$) to control ration concerning NFE digestibility.

2- Nutritive values of the tested rations:-

Digestible crude protein (DCP) and total digestible nutrients (TDN) of rations supplemented with cellulolytic enzymes were insignificantly higher tha control ration. Also ration supplemented with Asperozym (R_1) significantly ($P \leq 0.05$) increased SV % compared to ration supplemented with Phytabex plus® (R_2) and control ration.

3- Milk yield and its composition:-

There were no significant ($P \leq 0.05$) differences among control and cellulolytic enzymes rations in actual milk yield. Control ration recorded the lowest milk yield, being 339.4g/h/d followed by R_2, being 373.3 g/h/d. The highest value was detected for R_1, being of 385 g/h/d**.**Concerning 4% fat corrected milk , there were significant ($P \leq 0.05$) increases in fat corrected milk yield and fat percentage of (R1) and (R2) compared to control ration

4- Feed conversion:-

Insignificant differences for dry matter and energy intake (SV, TDN and DCP) was found between the tested

rations. Feed conversion of DM, SV and TDN of control ration was significantly ($P \leq 0.05$) decreased compared to (R_1) and (R_2) ration.On the other hand, there were no significant differences were detected in feed conversion of DCP between the tested rations.Also, there were insignificant differences between R1 and R2 regarding feed conversion.

5-Some bood serum parameters:-

Serum urea:-

The overall means of serum urea were 30.67, 32.33 and 34 (mg/dl) for control, R1 and R2, respectively.No significant differences were found between the tested rations for serum urea.

Serum creatinine:-

Averages of serum creatinine were 0.73, 0.73 and 0.70 (mg/dl) for control, R1 and R2, respectively.No significant differences were found between the tested rations for serum creatinine.

Aspartate aminotrasferase (AST):-

Serum AST values were 32.44, 31.86 and 32.38 (U/dl) for control; R1 and R2, respectively.The differences between rations were not significant.

Alanin aminotransferase (ALT):-

The overall means of serum ALT were 26.33, 24.36 and 25 (U/dl) for control; R1 and R2, respectively.The differences between rations were not significant.

Serum glucose:-

The results of serum glucose were 68.25, 69 and 71.67(mg/dl) for control; R1 and R2, respectively. No significant differences were found between the tested rations for serum glucose.

Serum total cholesterol:-

The overall means of serum cholesterol were 67.33, 69.33 and 68.67 (mg/dl) for control; R1 and R2, respectively. The differences between rations were not significant.

6- Simple economical evaluation of experimental rations:-

The economical values expressed as a net revenue (L.E./h/45d) were enhanced for lactating goats fed Asperozym ration compared with Phytabex plus® and control ration.

Conclusion:-

Fungal cellulase enzyme was locally produced (Asperozym) under the optimum conditions. This would contribute for reducing the amounts of feed additives imported and decrease the additives cost.The evaluated cellulolytic enzymes (Asperozym and Phytabex plus®) were increased IVDMD, IVOMD. Also, addation of Asperozym and Phytabex plus® to the rations of lactating baladi goats lead to marked increasing most of nutrient digestibilities and improving ($P \leq 0.05$) 4% fat corrected milk production.

From economical point of view, Asperozym ration was the best one for decreasing the cost of feeds to produce one kilogram milk.

Moreover , this study recommend to produce Asperozym enzyme and adding it to the ration of lactating goats .Further studies must be needed with differences animal breed.