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5- SUMMARY AND CONCLUSIONS

The experiments of the present study were carried out at Animal Production Department, Faculty of Agriculture, Kafrelsheikh University in cooperation with Sakha Animal Production Research Station (Kafrelsheikh Governorate), Animal Production Research Institute (APRI), Agricultural Research Center, Ministry of Agriculture during the period from July to November 2006.

This work included two experiments:

The first experiment: *In Situ* trial:

This experiment was conducted to study the effect of fibrolytic enzymes supplementation on *In Situ* degradability of DM, CP and CF of different feedstuffs included concentrate feed mixture (CFM), berseem hay (BH), dried sugar beet tops (DSBT), corn silage (CS), rice straw (RS) and wheat straw (WS) and the experimental rations consisted of 60 or 40% CFM and 40 or 60% BH, DSBT, CS, RS and WS.

The fibrolytic enzyme was added to the ground feedstuffs and the experimental rations at the levels of 0, 1 and 1.5 g/kg DM. The enzymes was diluted with water at 100 and 150 g / liter for the levels of 1 and 1.5 g / kg, respectively and sprayed with 10 ml per kg of ground feedstuffs and experimental rations. The *In Situ* ruminal degradability of DM, CP and CF were determined using three cannulated multiparous Friesian cows incubated for 2, 4, 8, 16, 24, 48 and 72 hours.

The results are summarized as follows:

1-Dry matter disappearance:

Concentrate feed mixture (CFM) showed significantly ($P<0.05$) the highest values of DM disappearance followed by DSBT, while both RS and WS had the lowest values. Rations contained DSBT showed significantly ($P<0.05$) the highest values of DM disappearance followed by rations contained BH, while rations contained RS or WS had the lowest values. Moreover, the percentage of *In Situ* DM disappearance for different feedstuffs and rations increased significantly ($P<0.05$) with added fibrolytic enzyme at the level of 1g/kg.

The degradation fractions and effective degradability of DM were differ significantly ($P<0.05$) among the different feedstuffs and rations. The DSBT showed the highest rapid degradable fraction (a), CS the highest potential degradable fraction (b), CFM had the highest degradation rate (c) and RS and WS had the highest undegradable fraction (u). Moreover, CFM showed the highest outflow rate of degradable DM at 2, 5 and 8%/ hour from the rumen. Rations contained DSBT showed the highest rapid degradable fraction (a), rations contained BH showed the highest potential degradable fraction (b), rations contained CS had the highest degradation rate (c) and increased with increasing concentrate level, while rations contained RS or WS had the highest undegradable fraction (u) and decreased with increasing concentrate level. Moreover, rations contained DSBT showed the highest outflow rate of degradable DM at 2, 5 and 8%/ hour from the rumen and increased with increasing concentrate level.

Fibrolitic enzyme treated feedstuffs and rations at the level of 1 g/ kg DM led to significant ($P<0.05$) increase in the rapid and potential degradable fractions, degradation rate and the outflow rate of degradable DM at 2, 5 and 8%/ hour from the rumen and significant ($P<0.05$) decrease in the undegradable fraction.

2- CP Disappearance:

Rations contained DSBT showed significantly ($P<0.05$) the highest values of CP disappearance followed by rations contained BH, while rations contained RS or WS had the lowest values. The percentage of *in situ* CP disappearance was significantly higher ($P<0.05$) for rations contained 60% concentrate: 40% roughage than rations contained 40% concentrate: 60% roughage for different feedstuffs. Moreover, the percentage of *in situ* CP disappearance for different feedstuffs and rations increased significantly ($P<0.05$) with added fibrolitic enzyme.

The DSBT showed the highest rapid degradable fraction (a), CS recorded the highest potential degradable fraction (b), CFM had the highest degradation rate (c), but BH, DSBT and RS showed the highest undegradable fraction (u). Moreover, CFM showed the highest outflow rate of degradable CP at 2, 5 and 8%/ hour from the rumen. Rations contained DSBT showed the highest rapid degradable fraction (a), rations contained CS recorded the highest potential degradable fraction (b), rations contained DSBT had the highest degradation rate (c), however, rations contained RS and WS showed the highest undegradable fraction (u). Moreover, rations contained DSBT showed the highest outflow rate of degradable CP at 2, 5 and 8%/ hour from the rumen. The degradable fractions (a&b), degradable rate (c) and outflow rate ($k=0.02, 0.05$ and 0.08) increased, but undegradable fraction (u) decreased with increasing

concentrate level and decreasing roughage level. Fibrolytic enzyme treated feedstuffs and rations led to significant ($P<0.05$) increase in the rapid and potential degradable fractions, degradation rate and the outflow rate of degradable CP at 2, 5 and 8%/ hour from the rumen and significant ($P<0.05$) decrease in the undegradable fraction.

3- CF Disappearance:

Rations contained DSBT showed significantly ($P<0.05$) the highest values of CF disappearance followed by rations contained BH, while rations contained RS or WS had the lowest values. The percentage of *in situ* CF disappearance was significantly higher ($P<0.05$) for rations contained 60% concentrate: 40% roughage than rations contained 40% concentrate: 60% roughage for different feedstuffs. Moreover, the addition of fibrolytic enzyme at the level of 1g/ kg resulted in significant increase ($P<0.05$) in the percentage of *in situ* CF disappearance for different feedstuffs and rations.

Concentrate feed mixture (CFM) showed the highest rapid degradable fraction (a), CS recorded the highest potential degradable fraction (b), CFM had the highest degradation rate (c), but WS showed the highest undegradable fraction (u). Moreover, CFM showed the highest outflow rate of degradable DM at 2, 5 and 8%/ hour from the rumen. Rations contained DSBT showed the highest rapid degradable fraction (a), rations contained BH recorded the highest potential degradable fraction (b), rations contained DSBT had the highest degradation rate (c), however rations contained WS showed the highest undegradable fraction (u). Moreover, rations contained DSBT showed the highest outflow rate of degradable CP at 2, 5 and 8%/ hour from the rumen. The degradable fractions (a&b), degradation rate (c) and outflow rate ($k=0.02, 0.05$ and 0.08) increased, but undegradable fraction (u) decreased with increasing

concentrate level and decreasing roughage level. Fibrolytic enzyme treated feedstuffs and rations at the level of 1 g/ kg DM led to significant ($P<0.05$) increase in the rapid and potential degradable fractions, degradation rate and the outflow rate of degradable CF at 2, 5 and 8%/ hour from the rumen and significant ($P<0.05$) decrease in the undegradable fraction.

2- The second experiment: feeding trial:

Thirty Friesian cows were divided into 6 similar groups (5 in each) fed the experimental rations as follows:

R1: 60 % CFM + 40 % BH with 1 g fibrozyme/ kg DM.

R2: 60 % CFM + 40 % BH without fibrozyme.

R3: 60 % CFM + 40 % CS with 1 g fibrozyme/ kg DM.

R4: 60 % CFM + 40 % CS without fibrozyme.

R5: 60 % CFM + 40 % RS with 1 g fibrozyme/ kg DM.

R6: 60 % CFM + 40 % RS without fibrozyme.

Cows mechanically milking and individually morning and evening milk yields were recorded daily for each cow. Milk samples were taken biweekly from the consecutive evening and morning milking for each cow and mixed for determine milk composition.

Six digestibility trials were conducted using three cows from each group to determine digestibility coefficients and nutritive values of the experimental rations. Rumen liquor samples were collected from the cows before feeding and at 2, 4 and 6 hours after feeding to determine rumen liquor parameters. Also, feed conversion and economic efficiency were calculated.

The results are summarized as follows:

- 1- Digestibility coefficients and nutritive values were significantly higher ($P<0.05$) for rations contained BH or CS compared with those contained rice straw. Moreover, nutrients digestibility and nutritive values increased significantly ($P<0.05$) with fibrolytic enzyme supplementation.
- 2- Cows fed ration contained CS showed the highest DM and TDN intake and those fed rations contained BH. While rations contained BH had the highest DCP intake, but those fed rations contained RS recorded the lowest intake. Moreover, the intake of TDN and DCP increased significantly ($P<0.05$) with fibrolytic enzyme supplementation.
- 3- Cows fed R3&4 recorded the highest TVFA's concentration and lowest pH value, but those fed R1&2 had the highest $\text{NH}_3\text{-N}$ concentration. The pH value decreased, but TVFA's and $\text{NH}_3\text{-N}$ concentrations increased gradually until 4 hours after feeding then decreased at 6 hours. Moreover, ruminal pH value and $\text{NH}_3\text{-N}$ concentration tended to decreased, but TVFA's concentration tended to increase with fibrolytic enzyme supplementation.
- 4- Cows fed rations contained corn silage (R3&4) recorded the highest milk and 4% FCM yield followed by those fed rations contained BH (R1&2), but those fed rations contained RS (R5&6) had the lowest yield. The yield of milk and 4% FCM increased significantly ($P<0.05$) with fibrolytic enzyme supplementation.
- 5- Cows fed rations contained CS (R3&4) recorded the higher milk fat, lactose and TS percentages and yield and ash yield and those fed rations contained BH (R1&2) out it had the highest protein percentage and yield, however the lowest values was noticed with cows fed rations contained RS (R5&6). The

percentages and yield of all milk constituents increased significantly ($P < 0.05$) with fibrolytic enzyme supplementation.

- 6- Cows fed ration contained RS (R5&6) recorded the higher amounts of DM and TDN than those fed ration contained BH (R1&2), it recorded the highest amount of DCP per 1 kg FCM. Fibrolytic enzyme supplementation led to significant ($P < 0.05$) decrease in the amount of DM per kg FCM, but did not significantly ($P > 0.05$) affected the amounts of TDN and DCP per kg FCM.
- 7- Rations contained BH (R1&2) showed the highest average daily feed cost and feed cost/ kg FCM. However, average daily feed cost did not significantly ($P < 0.05$) affected, but feed cost / kg FCM decreased significantly ($P < 0.05$) with enzyme supplementation. Cows fed R3&4 recorded the highest output of FCM yield and economic efficiency and increased significantly ($P < 0.05$) with enzyme supplementation.

Form these results it could be concluded that the in situ ruminal DM, CP and CF disappearance and degradation varied among the different feedstuffs according to their fiber content and were higher in experimental rations with the high concentrate: roughage ratio (60:40) and increased with fibrozyme supplementation. Moreover, cows fed rations contained corn silage showed the best results concerning digestibility, feed intake, rumen fermentation activity, milk yield and composition, feed conversion ratio and economic efficiency followed by those fed ration contained berseem hay, while those fed ration contained rice straw had the lowest performance. All studied performance parameters of Friesian cows improved significantly with fibrozyme supplementation.