

## LIST OF ABBREVIATIONS

AA	Amino acids
AAN	Amino acids nitrogen
ADG	Average daily gain
Al	Albumin
Al / Gl	Albumin / Globulin ratio
AOAC	Association of Official Analytical Chemists
ANF	Anti-nutritional factor
BL	Blood
BM	Blood meal
BW	Body weight
Ca	Calcium
CF	Crude Fiber
CFM	Concentrate feed mixture
CGM	Corn gluten meal
Cm	Centemeter
CP	Crude Protein
°C	Degree centigrade
DCP	Digestible crude protein
d.F	Degree of Freedom
dl	Deciliter
DM	Dry Matter
DMI	Dry matter intake
EAA	Essential amino acids
EE	Ether extract
FFSB	Fullfat soybean
FH	Fish hydrolysate
Fig	Figure
FM	Fish meal
G/h/d	Gram /head/day
GL	Globulin
GOT	Glutamic oxaloacetic transaminase
GPT	Glutamic pyruvic transaminase
GR	Gross energy
Hb	Haemoglobin
HCHO	Formaldehyde
HSBM	Heated soybean meal
IU/L	International unit per litre
IVFA	Individual volatile fatty acids
KG	Kilogram (s)
L	Litre

LBW	Live body weight
LE	Egyptian pound
LSM	Linseed meal
LYS.	Lysine
MBM	Meat and bone meal
Meq	Milliequivalent (s)
Met.	Methionine
MG	Milligram. (s)
MHA	Methionine hydroxy analogue
ML	Millilitre
MS	Mean squares
N	Nitrogen
NAN	Non ammonia nitrogen
NaoH	Sodium hydroxide
NFE	Nitrogen free extract
ng/ml	Nanogram per milliliter
NH3-N	Ammonia nitrogen
NO	Number
NR	Nutritive ratio
NRC	National Research Council
NSI	Nitrogen solubility index
OM	Organic matter
%	Percentage
PBPM	Poultry by-product meal
PF	Protected fat
PP	Protected protein
RBC <sup>s</sup>	Red blood cells
RDP	Rumen – degradable protein
RH	Relative humidity
RL	Rumen liquor
Rplys	Rumen protected lysine
RSM	Rapeseed meal
RUP	Rumen – undegradable protein
SBM	Soybean meal
SC	<i>Saccharomyces cerevisiae</i>
SE	Standard Error
S.O.V	Source of Variance
T	Ton
TDN	Total digestible nutrients
TIA	Trypsin inhibitor activity
TMR	Total mixed ration
TP	Total protein
TSBM	Treated soybean meal

UCSM	Uncorticated cotton seed
USBM	Untreated soybean meal
VFA's	Volatile fatty acids
WB	Wheat bran
WBC <sup>s</sup>	White blood cells
WG	Weight gain
YC	Yeast culture

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## **5- SUMMARY**

This study was conducted at Sakha Experimental Station, Animal Production Research Institute, Ministry of Agriculture, in cooperation with the Department of Animal Production, Faculty of Agriculture, Kafr El-Sheikh, Tanta University during the period from January to December 2002.

This study aimed to investigate the effect of feeding protected protein treated with formaldehyde in complete feed diets on productive and reproductive performance of lambs.

Forty-nine ewes in late pregnancy were divided into similar two groups: first group fed untreated soybean meal and the second group fed formaldehyde soybean meal. After lambing and at 3 months of age 38 lambs were in group (1) [10 male and 19 female] and group as a control (2) and 29 lambs were in group [10 male and 19 female] as treatment group.

### **Experimental rations:**

- \* Two tested mixed rations were isonitrogenous and isocaloric
- \* U-CFM and T-CFM were 15.18, 15.38, 3.87, 3.88, 4.55, 4.55, 72.69, 72.8 and 3.30, 3.39% for CP, EE, CF, NFE and ash, for control and treatment, respectively.

### **Digestibility trials :**

Two digestibility trials were carried out by using male lambs with average body weight of 47 kg were used in two digestibility trials, three in each to determine the nutritive value of the tested diets . The experimental animal were fed on two experimental total mixed rations as follow :



**1- Control :** contains untreated soybean meal (U-SBM).

**2-Treated: contains soybean meal treated with formaldehyde. Wheat straw was offered as 1% from the animal live body weight as a sole source of roughage for all groups with the concentrate mixture. Rumen liquor samples were taken from the same three lambs of each group at the end of the digestibility trials by using a stomach tube at three times, before feeding, 2, 4 and 6 hours after the morning feeding . Rumen fluid samples were analyzed for individual, total VFA's , NH<sub>3</sub> – N and rumen pH.**

Reproductive performance:

**Male lambs used in growing trial were subjected to observe the onset of changes in sexual behaviour, once every 10 days interval started from 3 months of age till the occurrence of puberty.**

The following criteria were recorded:-

- (a) Age at puberty i.e. age at first collected ejaculate containing live motile spermatozoa.**
- (b) Body weight (kg) at puberty.**
- (c) Scrotal circumference (cm) at puberty.**
- (d) Testosterone concentration (ng/ml) at puberty.**

**Semen evaluation:**

The following physical semen characteristics were evaluated in fresh collected semen: Seminal volume, Initial motility, Percentage of live - dead spermatozoa, Percentage of abnormal

spermatozoa, Sperm cell concentration ( $\times 10^9$ / ml), Sperm output ( $\times 10^9$ / ejaculate) and Sperm output live normal ( $\times 10^9$ / ejaculate)

### **Attainment of puberty in ewe lambs:-**

Twenty ewe lambs were observed for the onset of estrous three times daily at 6 a.m., 12 p.m. and 6 a.m. thirty minutes for each. Two vasectomized male lambs were used for testing the ewes. Ewes that were seen to be receptive and stood for mounting by the ram was considered to be in estrous.

### **The results obtained are summarized as follows:**

#### **Ewes performance:-**

- Body weight of ewes tended to increase with progress of gestation period till lambing, then decreased sharply due to lambing and tended to increase gradually with the progress period after lambing. Body weight of ewes fed protected protein tended to be higher in compared with control group.

#### **Colostrum composition:**

- The overall mean contents of protein and SNF were significantly higher in colostrum of ewe fed treated soybean meal than control group. Moreover, the overall mean of percentages of fat, protein, lactose, SNF, TS and ash in colostrum of treated group improved by 1.48, 21.21, 8.99, 14.03, 9.23 and 10.53% than the control group, respectively.

### **Milk composition:**

- The overall mean contents of fat, protein, lactose, SNF, TS and ash during the period from 4 to 7 days post lambing in milk of ewes fed protected protein improved by 13.81, 13.09, 10.69, 10.94, 13.24 and 1.25% compared with control group respectively.

### **Digestibility and nutritive value:**

- The obtained results showed that the average digestion coefficient of control and treatment were 61.70, 65.82 for DM, 62.45, 67.12 for OM; 47.18, 52.21 for CP ; 40.42, 41.76 for CF; 55.65, 60.82 for EE and 70.3, 75.52 for NFE, respectively. The results showed that the higher significant ( $P < 0.05$ ) values of DM, OM, CF, EE and NFE digestibilities were recorded with sheep supplemented with protected protein than control.

### **Nitrogen balance:-**

- The average value of nitrogen balance, nitrogen digested, nitrogen balance as a percentage of nitrogen intake and nitrogen value increased significantly in comparison to the control.

### **Ruminal pH value:-**

- Results showed pH values of rumen fluid treated group at 2, 4, 6 hours post feeding and overall mean was higher significantly ( $P < 0.05$ ) than control group.

### **Ammonia-N concentration:**

- The concentration of ruminal  $\text{NH}_3\text{-N}$  at 2, 4, 6 hours post feeding and overall mean of control group was higher significantly than treated group.

### **Total volatile fatty acid's (TVFA):-**

- It is obvious that concentration of TVFA's at 2, 4 and 6 hours post feeding in rumen fluid of control group was higher significantly compared with treated group. The overall mean of TVFA's concentration in rumen fluid were 14.93 and 12.93 mEq/100 ml for control and treated group, respectively.

#### **Concentration of serum total protein and their fractions:**

- The concentrations of total protein, albumin and globulin in blood serum were nearly similar for control and treated groups. Moreover, the concentrations of total protein and albumin increased significantly with age progress up to 5 month and decreased afterwards.

#### **Activity of transaminases (AST) and (ALT):**

- The activities of AST and ALT as well as AST to ALT ratio tended to be higher in blood serum of treated than control group, however the differences were not significant.

#### **Growth performance:**

##### **Growth rate:**

- Average initial weights of lambs in the two treatment groups were nearly equal being 19.61 and 19.81 kg for control and treatment, respectively.

#### **Economic efficiency:**

- Lambs fed protected protein recorded significantly the higher price of daily gain and economic efficiency and the lower feed cost per kg gain compared with control group. Feed cost for producing one kg of weight gain was 7.06 and 5.88 LE for control

and treated groups, respectively. However, economical efficiency was 0.56 and 0.87 for control and treatment, respectively.

### **Reproductive performance of ram lambs:**

#### **Development of sexual behaviour:**

- The first sign of sexual interest (mounting without erection) was occurred at a mean age of 187.7 & 173.7 days ; 23.4 & 23.13 kg body weight ; 13.27 & 13.23 cm scrotal circumference and 1.59 & 1.74 ng/ml testosterone concentration for ram lambs fed control and protected protein, respectively. No significant differences due to dietary treatment were observed during the first mounting without erection.
- The first, mounting with erection was observed at the age of 206.9 & 202.5 days ; 32.7 & 35.13 kg body weight ; 16.63 & 19.13 cm scrotal circumference and 1.78 and 2.00 ng/ml testosterone concentration for lambs fed control and protected protein diets, respectively.
- First ejaculate containing motile spermatozoa was donated at the age of 265.9 & 243 days ; 43.33 & 49.9 kg body weight; 20.73 and 24.03 cm scrotal circumferences and 2.03 & 2.34 ng/ml testosterone concentration in ram lambs fed control and protected protein diets, respectively.

### **Reproductive performance of ewe lambs:**

- Average daily gain during the experimental period (240 days) was greater for the ewe lambs fed the protected protein (113.3 g/day) than those fed control diet (99.6 g/day). The heavy ewe lambs which fed protected protein attained their first pubertal estrus 24 days earlier and 4.6 kg heavier than ewe lambs fed

control diet. In both two experimental groups, the day of puberty was defined as an elevation in serum progesterone concentrations  $\geq 0.5$  ng/ml for  $\geq 7$  days.

**Prepubertal progesterone profiles (P4):**

- Serum P4 concentrations equal or greater than 0.5 ng/ml for  $\geq 7$  days were used to identify reproductive cycles (puberty) assuming that such levels of P4 were of luteal origin. Prepubertal ewes for two groups may ovulate in response to the male effect only towards the beginning of the normal breeding season but not earlier, through contact with males seems to advance onset of puberty by about four weeks.