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# EFFECT OF CHEMICAL AND BIOLOGICAL TREATMENTS OF CORN COBS ON SHEEP PRODUCTIVE PERFORMANCE.

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## ABSTRACT

This experiment was carried out to investigate the effect of chemical (4% urea), biological (Fungi *Phanerochaete* sp.) or urea plus fungi treatments on nutrients digestibility and feeding values of corn cobs by-product. Sixteen crossbred Suffolk male lambs (8 weeks old) with average live body weight of 19.5 kg were randomly divided into four groups (4 lambs each) and were used to evaluate the four experimental rations. The rations were composed of concentrate feed mixture (CFM) to provide 60% of the recommended DM requirements for sheep (NRC, 1989). The four experimental treatments were : T1- 60% CFM + corn cabs untreated ad-libitum (ad-lib) (control ration). T2- 60% CFM + corn cabs treated (4%) urea, *ad lib*.. T3 - 60% CFM + corn cabs treated fungi (Phanerochaete sp.), *ad lib* and T4- 60% CFM + corn cabs treated urea plus fungi, *ad lib*. Four digestibility trails were carried out using crossbred male lambs. Blood serum parameters for liver and kidney functions were determined.

**The main results were as follow:**

1- The DM, OM, CP and CF digestibilities differed among the four experimental groups were significant (P<0.05), T4 (urea plus fungi) recorded the highest values, while T1 (The control) recorded the lowest ones.
2- The nutritive value as TDN in T4 treatment was significantly (P<0.05) increased than control and chemical treated corn cobs , while DCP for the same treatement was also higher (P<0.05) than all other treatments.
3- The total body gain (kg) of T1, T2 and T3 were nearly similar (25, 25.5 and 26) respectively, but the T4 showed greater respective value (29 kg) and improved feed conversion (9.36 DM kg /kg gain).
4- The higher values of liver function estimates (Total protein, albumin, globulin, Alkalin-phosphates, AST and ALT and kidney function (Urea-N and creatinine) were recorded with urea plus fungi followed by fungi treatments compared to urea and control treatments
5- Most of the blood serum parameters were within the range of the normal values for healthy lambs.
6- Regarding the effect of sampling times all parameters significantly increased to maximum level at day 165 after feeding.
7- Results obtained in this study showed that urea plus fungi treatment showed the best digestibilities of most nutrients, nutritive values, feed intake, live body weight and economic efficiency. It also kept most of blood serum parameters tested were within the normal range. Therefore, using corn cobs treated with urea plus fungi in lamb nutrition could be recommended as good feed quality and possible replacement of traditional roughage and part of concentrates.

**Keyword:** lambs, digestibility, nutritive values, liver function , kidney function chemical and biological treatments, corn cobs .

## INTRODUCTION

There is a wide gap between the available feedstuffs and farm animal requirements in Egypt. This was estimated as shortage of 3.1 million tons of TDN per year (Abou-Akkada 1988). However, only 4.0 to 4.3 million tons of crop residues out of 13.7 - 15.2 million tons produced are used for ruminants feeding (Hathout and EL- Nouby, 1990). The primary factors limiting the utilization of crop residues are mainly their low digestibility, protein content and inferior palatability. To improve digestibility of such crop residues, it is important to breakdown the linkages among cellulose, hemicellulose and lignin by mechanical, chemical or biological treatments.

Gupta and Langer, (1988) reported that chemical , biological and biochemical treatments of wheat straw showed increased CP content). Also, Marwoha *et al* (1990) reported that ammoniation decreased CF, EE, NFE, NDF, hemicellulose , cellulose and lignin compared with untreated wheat straw.

This study was conducted in order to evaluate the effect of chemical (4% urea), biological (Fungi *Phanerochaete* sp.) and biochemical (urea plus fungi) treatments of corn cobs compared to untreated (control) on growth performance and some blood parameters of growing lambs.

## MATERIALS AND METHODS

### 1- Animal and management:

This study was carried out at El- Gemmaiza Experimental Station, Animal Production Research Institute, Ministry of Agriculture, Egypt. In this regards, 16 crossbred Suffolk male lambs (average weight 19.5 kg) were separated from their dams after weaning (at 8 weeks) and divided into 4 groups (each group of 4 lambs). All lambs were provided with concentrate feed mixture (CFM) to cover 60% of DM requirements as recommended by NRC (1989). Lambs were fed CFM and corn cobs as group feeding. They were also aid lib on corn cobs either being untreated (T1 control), treated with 4% urea (T2), fungi *Phanerochaete* sp (T3) or urea plus fungi (T4).

### 2- Chemical and biological treatments:

Corn cobs was chopped to length of 0.5 cm using a locally assembled machine (chopper). Chemical and biological treatment were then applied to roughage.

### 2.1. Chemical treatment:

One lot of chopped corn cobs was treated with 4% urea. The required amount of urea (40 g) was dissolved in 500 mal water and sprayed on 1 kg of chopped crop residues. The treated corn cobs was thoroughly to be homogenous and the moisture adjusted to approximately 70 % were bagged in airtight polyethylene sheets. After 21 days the urea treated roughage was taken out and aerated for to days in other to get rid of free ammonia smell.

**2.2. Biological treatment:**

Two different media were used during the growing fungus: a. Potato dextrose agre medium (PDA), Difco Manual (1984) was used as maintenance for fungal culture. b. Nutrient glucose broth (modified by Fouda *et al* ., 1960), the medium was used to prepare the fungal inoculum of *Phanerochaete chrysosporium*.

Inoculation was carried out in conical flacks (500 ml capacity ) containing 100 ml of nutrient glucose broth (It consists of 5.0 g/L peptone, 20.0g/L glucose, 5.0 g/L yeast extract and 3.0 g/L beef extract. pH was adjusted to 5.6 before autoclaving at $121^0$ C for 20 minutes). Flask was sterilized , cooled and inoculated with 3 days old slant culture of the fungal growth then inoculated on rotary shake (200 rpm) at 28 $^0$C for 3 days. This inoculum was used to inoculated one liters of sterilized nutrient glucose broth (by 10 % v/v) and incubated as mentioned previous. Maximum growth was obtained after 7 days.

The prepared inoculum was mixed well with the tested corn cobs at the rate 1:10 (v/w). The moisture was adjusted to approximately 70 % were bagged in polyethylene bags and left for 4 weeks at 28 $^0$C. After the fermentation period , the biological treated corn cobs were taken out and aerated for 2 days.

**2.3. Biochemical treatment:**

The required of chopped corn cobs treated with 4 % urea (as mentioned before with chemical treatment). At the end of ensiling period for ureated crop residues, it aerated over night and then mixed with fungal inoculum then bagged and incubated up to 4 weeks.

**3-Feeding trail** :

The feeding trail were extended from weaning (at 8 weeks) up to the marketing weight (at 32 weeks old). The lambs were individually weighed at weaning and thereafter at biweekly intervals during the experimental period in the morning after fasting for 12 hours just before feeding and drinking. Weaning weight, daily DM intake, live body weight, daily and total body weight gain and feed conversion were recorded throughout the experimental period. The chemical composition of ingredients and tested rations were determined and presented in Table 1. Four metabolism trails were carried out using (3 animals from each group) at the end of the experiment. The animals were fed individually in metabolic cages. Water were available at all times. Vitamin and mineral blocks mixture were also provided freely. Each trail lasted 27 days, 20 days as a preliminary period and 7 days as a collection period. Chemical analysis of ingredients and feces was carried out according to A.O.A.C.(1995).

**4-Blood samples :**

Blood samples were collected by jugular vein puncture in clean test tubs from all animals in the morning just before feeding and drinking at weaning (60 days old), 90 days old and thereafter at 15 days intervals up to 165 days old. Blood samples were left to clot for 24 h in the refrigerator and centrifuged at 4000 rpm for 15 minutes. Blood serum samples were carefully separated and stored at - 20 $^0$C for determination of total proteins (TP) , albumin, globulin, albumin / globulin ratio (A/G ratio), urea nitrogen, creatinine, alklin-phosphatase , aspartate amino transferase (AST) and alanine amino transferase (ALT). Total proteins (TP) and albumin were determined according to Doumas and Biggs (1972 a & b), globulin was calculated by subtraction concentration of albumin from the corresponding total protein then albumin/ globulin ratio (A/G ratio) was also calculated. Urea nitrogen concentration was determined according to Talke and Schubert (1965), creatinine concentration according to Bartels (1971), alkalin-phosphatase activity according to Kind and King (1954) and AST and ALT activities as described by Reitman and Frankel (1957).

**5-Statistical analysis**:

The statistical analysis was computed using analysis of variance procedure described in the SAS (1995) and significant differences among means were separated by Duncan's (1955) multiple range test.

## RESULTS AND DISCUSSION

**Chemical composition of corn cobs residues and experimental rations:-**

The data in Table (1) showed that the chemical composition of corn cobs was affected by treatments with either urea (T2) and fungi (T3) or urea plus fungi (T4) which decreased DM, OM and CF contents than the control untreated group.

**Table (1) : Chemical composition (DM Basis %) of untreated and treated corn cobs as well as concentrate feed mixture (CFM).**

| Items | DM | OM | CP | CF | EE | NFE | Ash |
|---|---|---|---|---|---|---|---|
| Corn cobs (untreated) | 90.72 | 95.65 | 2.24 | 46.07 | 2.55 | 44.79 | 4.35 |
| Corn cobs +urea | 89.72 | 95.47 | 3.81 | 44.01 | 2.16 | 45.49 | 4.53 |
| Corn cobs + fungi | 87.86 | 95.05 | 3.90 | 44.60 | 2.33 | 44.22 | 4.95 |
| Corn cobs +urea plus fungi | 86.93 | 94.55 | 8.31 | 39.14 | 2.40 | 44.70 | 5.45 |
| CFM * | 90.19 | 89.89 | 18.04 | 14.75 | 4.50 | 52.60 | 9.81 |

*** The ingredient of concentrate fed mixture (CFM) were:Undecorticated cotton seed cake 35%, yellow corn 22%, rice bran 4%, wheat bran 33%, limestone 2%, salt 1 % and molasses 3%.**

On the other hand, the CP content in urea plus fungi treatment (T4) considerably increased than other treatments. The same trend was found by Fouad *et al* (1998) with corn cobs, who reported that the chemi-fungi treatment decreased the CF and improved the CP contents of treated crop residues compared to the untreated ones. This would be reflected on CP content of consumed rations including treated cobs. The increase in CP was much more pronounced in (T4) reaching about 3.71 times as that of the control group *VS* 1.70 in T2 and 1.74 in T3.

It clearly appears that the improvement in the CP (Table 1) was on the expense of decreasing the CF and either extract. Ash content also tended to increase with the treatment of corn cobs especially in T4 group.

**Digestibility coefficients and nutritive value:-**

The data presented in Table (2) show that the digestibility coefficients of DM, OM, CP and CF for T2, T3 and T4 treatments were significantly ($P<0.05$) increased over the control group. The digestibility coefficient improvement may be due to improvement of the chemical composition. These results are in agreement with the findings of Agosin *et al* (1986) which indicated that *Phanerochaete chrysosporium* increased DM digestibility. Deraz (1996) also indicated that the chemical and chmi-fungal treatments of chopped rice straw and corn stalks resulted in increasing of OM, CP and CP digestibilities than those of untreated roughage. Salman *et al* (1998) found that 3% urea treated corn stalks significantly ($P<0.05$) increased OM, CP and CF digestibliteis. Bassuny et al (2003) indicated that 4% urea and urea plus fungi treated corn cobs significantly ($P<0.05$) increased OM, CP and CF digestibliteis than untreated corn cobs. While, the improvements in EE and NFE were not significant. The DM digestibliteis was significantly higher in favor of fungi treatment ($P<0.05$) over urea plus fungi and urea treatments, where the control exhibited the lowest DM digestibility value.

**Table (2) : Digestibility coefficients and nutritive values of the experimental rations.**

| Items | T1 | T2 | T3 | T4 |
|---|---|---|---|---|
| Digestibility coefficient, % | | | | |
| DM | $58.35 \pm 0.55^{a}$ | $62.47 \pm 2.03^{a}$ | $81.28 \pm 1.26^{b}$ | $80.91 \pm 1.10^{b}$ |
| OM | $61.80 \pm 0.59^{a}$ | $66.26 \pm 0.92^{b}$ | $81.90 \pm 0.51^{c}$ | $82.72 \pm 1.04^{c}$ |
| CP | $59.61 \pm 0.15^{a}$ | $63.42 \pm 1.29^{b}$ | $79.09 \pm 0.74^{c}$ | $81.03 \pm 1.24^{c}$ |
| CF | $49.59 \pm 1.62^{a}$ | $62.74 \pm 2.45^{b}$ | $70.41 \pm 0.62^{c}$ | $74.70 \pm 1.63^{c}$ |
| EE | $59.92 \pm 9.75^{a}$ | $56.54 \pm 2.22^{a}$ | $68.09 \pm 1.38^{a}$ | $68.18 \pm 1.66^{a}$ |
| NFE | $69.00 \pm 1.10^{a}$ | $68.56 \pm 2.15^{a}$ | $89.20 \pm 0.73^{b}$ | $88.29 \pm 1.07^{b}$ |
| Nutritive value, % | | | | |
| TDN | $59.79 \pm 0.64^{a}$ | $63.21 \pm 2.05^{a}$ | $78.56 \pm 0.21^{b}$ | $79.00 \pm 1.18^{b}$ |
| DCP | $7.50 \pm 4.67^{a}$ | $7.65 \pm 0.14^{a}$ | $10.10 \pm 7.67^{b}$ | $11.58 \pm 0.31^{b}$ |

**a, b and c values with different letters in the same row differ significantly at ($P<0.05$).**
**T1: Untreated corn cobs (control), T2, T3 and T4, Corn cobs treated with 4% urea, fungi and 4% urea plus fungi, respectively.**

Urea treatment has the effect of loosening lignocellulotic bonds and solubilizes some of the hemicellulose content. Several factors, however affect cellulase activity of fungi such as temperature, pH, aeration .etc. (Fadel *et al.*, 1992). Ward and Perry (1982) found that corn cobs treated with fungi significantly ($P<0.01$) increased the digestibility of DM and NFE, while it significantly ($P<0.01$) decreased the digestibility of both CF and EE and did not effect CP digestibility.

Nutritive value expressed higher ($P<0.05$) digestible crude protein (DCP) response to fungi or urea plus fungi treatments than urea or control treatments. Total digestible nutrients (TDN) followed the same trend of DCP. Fungi and urea plus fungi surpassed urea treatment which, was significantly

(P<0.05) higher than control. The differences among the four treatments may be due to variation in ash content. Results of this study agree with those of Ward and Perry (1982), EL- Ashry *et al* (1997) and Bassuny *et al.* (2003).

However, the results of this study were higher than the values obtained by EL- Ashry *et al* (1997) in DM, OM, CP, CF, EE and NFE digestibility except for DM on rice straw and corn stalks.

**Live body weight:-**

From data in Table (3) it could be noticed that there were no significant differences among live body weight between all treatments from weaning up to 18th weeks. However, the lambs fed on urea plus fungi treatments had higher value of live body weight (32.50 kg) than other treatments. Starting from 20 to 32 weeks the difference in live body weight between lambs belonging to T4 and those of the other groups was much more pronounced (Table 3). Lambs fed on control ration had the lowest value of the live body weight than the other treatments.

**Table (3) : Average live body weight (kg) of growing lambs fed the experimental rations from weaning ( at 8 weeks ) up to 32 weeks.**

| Age (Weeks) | Treatments | | | |
|---|---|---|---|---|
| | T1 | T2 | T3 | T4 |
| 8-10 | 19.75 ± 1.75 | 19.50 ± 2.10 | 19.75 ± 1.80 | 19.25 ± 1.32 |
| 10-12 | 21.00 ± 1.83 | 21.00 ± 1.96 | 21.00 ± 1.58 | 21.00 ± 1.08 |
| 12-14 | 23.25 ± 1.75 | 23.00 ± 2.12 | 23.25 ± 1.25 | 23.25 ± 0.63 |
| 14.16 | 26.00 ±1.96 | 26.25 ±2.04 | 26.00 ± 1.08 | 26.25 ± 0.75 |
| 16-18 | 28.75 ± 2.17 | 28.50 ± 1.85 | 28.75 ± 0.85 | 29.25 ± 0.75 |
| 18-20 | 31.50 ± 2.40 | 31.0 ± 2.27 | 31.25 ± 0.63 | 32.50 ± 0.65 |
| 20-22 | 34.0 ± 2.48 | 33.0 ± 2.48 | 33.50 ± 0.65 | 36.0 ± 0.58 |
| 22-24 | 37.0 ± 2.74 | 35.50 ± 2.87 | 35.75 ± 0.75 | 38.25 ± 0.85 |
| 24-26 | 39.25 ± 2.50 | 37.50 ± 3.20 | 37.25 ± 0.48 | 40.75 ± 0.95 |
| 26-28 | 41.50 ± 2.53 | 39.75 ± 3.64 | 39.75 ± 0.25 | 42.75 ±1.32 |
| 28-30 | 42.50 ± 2.53 | 42.03 ± 3.39 | 42.0 ± 0.41 | 44.75 ± 1.31 |
| 30-32 | 43.75 ± 2.66 | 44.25 ± 3.52 | 44.75 ± 0.63 | 47.0 ± 1.47 |
| 32 | 44.75 ± 2.66 | 45.0 ± 3.66 | 45.75 ± 0.63 | 48.25 ± 1.55 |

**Non significant.**

**T1: Untreated corn cobs (control), T2, T3 and T4, Corn cobs treated with 4% urea, , fungi and 4% urea plus fungi, respectively.**

It could be suggested that the live body weight increased, specially the lamb fed urea plus fungi treatment, due to increasing DM intake (Table 4) which might indicates more palatability or might be due to the high digestibility of most nutrients and greater nutritive value of T4. The live body weight at the 32th weeks for all treatments ranged from 44.75 kg in T1 to 48.25 kg of T4 treatment.

**Table (4) : Average daily dry matter intake* (g / head) by lambs (8-32 weeks) for experimental rations.**

| Weeks | T1 | | | T2 | | | T3 | | | T4 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C.F.M | Corn cobs | Total | C.F.M | Corn cobs | Total | C.F.M | Corn cobs | Total | C.F.M | Corn cobs | Total |
| 8-10 | 592 | 398 | 990 | 592 | 460 | 992 | 592 | 393 | 985 | 592 | 395 | 987 |
| 10-12 | 630 | 377 | 1007 | 630 | 380 | 1010 | 630 | 394 | 1024 | 630 | 399 | 1029 |
| 12-14 | 698 | 452 | 1150 | 690 | 471 | 1161 | 698 | 466 | 1164 | 698 | 465 | 1163 |
| 14-16 | 718 | 484 | 1202 | 725 | 493 | 1218 | 718 | 513 | 1231 | 725 | 467 | 1192 |
| 16-18 | 776 | 534 | 1310 | 770 | 517 | 1287 | 776 | 520 | 1296 | 789 | 479 | 1268 |
| 18-20 | 850 | 542 | 1392 | 818 | 576 | 1394 | 825 | 562 | 1387 | 858 | 544 | 1402 |
| 20-22 | 898 | 584 | 1482 | 871 | 612 | 1483 | 844 | 608 | 1492 | 950 | 626 | 1576 |
| 22-24 | 977 | 601 | 1578 | 937 | 626 | 1563 | 944 | 629 | 1573 | 1009 | 674 | 1683 |
| 24-26 | 995 | 612 | 1607 | 990 | 635 | 1625 | 983 | 636 | 1619 | 1030 | 682 | 1712 |
| 26-28 | 1042 | 638 | 1680 | 1001 | 641 | 1642 | 1001 | 654 | 1655 | 1062 | 698 | 1760 |
| 28-30 | 1058 | 652 | 1710 | 1051 | 667 | 1718 | 1051 | 677 | 1728 | 1090 | 730 | 1820 |
| 30-32 | 1074 | 660 | 1734 | 1082 | 670 | 1752 | 1090 | 680 | 1770 | 1134 | 740 | 1874 |
| Average | 859 | 544.5 | 1403.5 | 846.42 | 562.33 | 1408.75 | 846 | 561 | 1407 | 880.58 | 574.92 | 1455.5 |

**T1: Untreated corn cobs (control), T2, T3 and T4: Corn cobs treated with 4% urea, fungi and 4% urea plus fungi, respectively.**

* **Group feeding**

### Growth performance:-

The data presented in Table (5) clearly show that total body gain (kg) for T1, T2 and T3 treatments were nearly similar (25, 25.5 and 26 kg, respectively), but in T4 showed higher value (29kg) which may be due to increasing DM intake (Table 4) and increase in nutrients digestibility (Table 2). The average daily body gain was consequently higher for T4 treatment than other treatments which may be due to the improvement of feed intake and the nutrient utilization efficiency of urea plus fungi treated corn cobs with advancing time by lambs. These finding are in agreement with those obtained by Gado (1997) on bagasse, Mohamed, *et al.*, (1998) on rice straw and Abdulla on corn cobs (2002).

**Table (5) : Effect of different treatments of corn cobs by-product ration fed to lambs on growth performance compared to untreated control ration.**

| Items | Treatments | | | |
|---|---|---|---|---|
| | T1 | T2 | T3 | T4 |
| Initial weight (kg) | 19.75 ± 1.75 | 19.50 ± 2.10 | 19.75 ± 1.80 | 19.25 ± 1.32 |
| Final weight (kg) | 44.75 ± 2.66 | 45.0 ± 3.66 | 45.75 ± 0.63 | 48.25 ± 1.55 |
| Total gain (kg) | 25.00 | 25.50 | 26.00 | 29.00 |
| Daily body gain (kg) | 0.149 ± 1.07 | 0.152 ± 2.31 | 0.155 ± 1.25 | 0.173 ± 1.15 |
| Daily feed intake (kg) | 1.55 | 1.55 | 1.56 | 1.62 |
| Feed conversion (feed / gain ) (kg DMI / kg gain) | 10.40 | 10.20 | 10.06 | 9.36 |

**Non significant.**

**T1: Untreated corn cobs (control), T2, T3 and T4, Corn cobs treated with 4% urea, fungi and 4% urea plus fungi, respectively.**

The data of daily body gain (kg) and daily feed intake (kg) were reflected on the feed conversion (gm feed / gm gain) which was the best for urea plus fungi treatment (9.36). Results of this study agree with those of Mohamed, *et al.*, (1998) and Abdulla (2002).

**Table (6):Effect of age and feeding rations containing corn cobs treated with different methods on lambs blood serum protein fraction, liver and kidney function after feeding.**

| Blood components | Age of lamb | Treatments T1 | T2 | T3 | T4 | Overall mean | Normal range |
|---|---|---|---|---|---|---|---|
| Protein fraction: | | | | | | | |
| Total protein (g/dl) | 60 days at weaning | 5.750 ± 0.16 | 5.702 ± 0.08 | 5.908 ± 0.17 | 6.353 ± 0.24 | 5.928 ± 0.16$^{a}$ | |
| | 90 days | 5.808 ± 0.27 | 6.478 ± 0.18 | 6.557± 0.42 | 5.974 ± 0.21 | 6.204 ± 0.27$^{ab}$ | |
| | 105 days | 5.923 ± 0.62 | 6.744 ± 0.21 | 6.924 ± 0.67 | 7.481 ± 0.67 | 6.768 ± 0.54$^{ab}$ | |
| | 120 days | 6.071 ± 1.87 | 7.029 ± 0.30 | 7.180 ± 0.29 | 6.228 ± 0.23 | 6.627 ± 0.67$^{ab}$ | 6-8 |
| | 135 days | 6.652 ± 0.42 | 8.038 ± 0.30 | 6.665 ± 0.31 | 7.444 ± 0.40 | 7.200 ± 0.36$^{b}$ | (g/dl) |
| | 150 days | 7.596 ± 0.12 | 7.269 ± 0.17 | 7.765 ± 0.16 | 10.047± 0.50 | 8.169 ± 0.24$^{c}$ | |
| | 165 days | 8.750 ± 0.20 | 6.856 ± 0.17 | 8.260 ± 0.23 | 9.846 ± 0.36 | 8.428 ± 0.24$^{c}$ | |
| | Overall mean | 6.650 ± 0.52$^{a}$ | 6.874 ± 0.20$^{a}$ | 7.037 ± 0.32$^{a}$ | 7.625 ± 0.37$^{b}$ | | |
| Albumin (g/dl) | 60 days at weaning | 2.573 ± 0.09 | 3.178 ± 0.24 | 3.208 ± 0.39 | 3.457 ± 0.12 | 3.104 ± 0.21$^{a}$ | |
| | 90 days | 3.239 ± 0.13 | 3.535 ± 0.11 | 3.456 ± 0.22 | 4.069 ± 0.14 | 3.575 ± 0.15$^{ab}$ | |
| | 105 days | 3.321 ± 0.10 | 2.878 ± 0.24 | 3.893 ± 0.24 | 3.780 ± 0.12 | 3.468 ± 0.18$^{ab}$ | |
| | 120 days | 3.123 ± 0.17 | 3.794 ± 0.09 | 3.641 ± 0.04 | 3.462 ± 0.05 | 3.505 ± 0.09$^{ab}$ | 3.5-5 |
| | 135 days | 4.158 ± 0.15 | 3.952 ± 0.19 | 3.907 ± 0.35 | 4.490 ± 0.38 | 4.127 ± 0.27$^{bc}$ | (g/dl) |
| | 150 days | 3.765 ± 0.21 | 4.481 ± 0.23 | 4.696 ± 0.17 | 4.088 ± 0.21 | 4.258 ± 0.21$^{c}$ | |
| | 165 days | 5.167 ± 0.24 | 4.794 ± 0.18 | 3.961 ± 0.17 | 5.245 ± 0.19 | 4.792 ± 0.20$^{cd}$ | |
| | Overall mean | 3.621 ± 0.16$^{a}$ | 3.802 ± 0.18$^{a}$ | 3.823 ± 0.23$^{a}$ | 4.085 ± 0.17$^{b}$ | | |
| Globulin (g/dl) | 60 days at weaning | 3.177 ± 0.12 | 2.524 ± 0.29 | 2.700 ± 0.28 | 2.896 ± 0.69 | 2.824 ± 0.35$^{a}$ | |
| | 90 days | 2.569 ± 0.20 | 2.943 ± 0.29 | 3.101 ± 0.08 | 1.905 ± 0.24 | 2.629 ± 0.20$^{ab}$ | |
| | 105 days | 2.602 ± 0.40 | 3.866 ± 0.28 | 3.031 ± 0.29 | 3.701 ± 0.67 | 3.300 ± 0.41$^{bc}$ | |
| | 120 days | 2.948 ± 0.18 | 3.235 ± 0.15 | 3.539 ± 0.09 | 2.766 ± 0.30 | 3.122 ± 0.18$^{c}$ | 2-5 |
| | 135 days | 2.494 ± 0.25 | 4.086 ± 0.25 | 2.758 ± 0.39 | 2.954 ± 0.34 | 3.073 ± 0.31$^{abc}$ | (g/dl) |
| | 150 days | 3.831 ± 0.42 | 2.788 ± 0.51 | 3.069 ± 0.22 | 5.959 ± 0.28 | 3.911 ± 0.36$^{abc}$ | |
| | 165 days | 3.583 ± 0.21 | 2.062 ± 0.38 | 4.299 ± 0.16 | 4.601 ± 0.52 | 3.636 ± 0.32$^{bc}$ | |
| | Overall mean | 3.029 ± 0.25$^{a}$ | 3.072 ± 0.31$^{a}$ | 3.214 ± 0.22$^{a}$ | 3.540 ± 0.43$^{b}$ | | |
| A/G ratio | 60 days at weaning | 0.810 ± 0.24 | 1.259 ± 1.05 | 1.188 ± 0.68 | 1.194 ± 0.15 | 1.113 ± 0.53$^{a}$ | |
| | 90 days | 1.261 ± 0.96 | 1.201 ± 0.18 | 1.114 ± 0.13 | 2.136 ± 0.35 | 1.428 ± 0.41$^{a}$ | |
| | 105 days | 1.276 ± 0.70 | 0.744 ± 0.07 | 1.284 ± 0.35 | 1.021 ± 0.33 | 1.081 ± 0.36$^{a}$ | |
| | 120 days | 1.059 ± 1.52 | 1.173 ± 0.18 | 1.029 ± 0.20 | 1.252 ± 0.18 | 1.128 ± 0.52$^{a}$ | |
| | 135 days | 1.667 ± 0.57 | 0.967 ± 0.34 | 1.417 ± 1.56 | 1.520 ± 0.22 | 1.393 ± 0.67$^{a}$ | |
| | 150 days | 0.983 ± 1.03 | 1.607 ± 0.51 | 1.530 ± 0.24 | 0.686 ± 0.68 | 1.202 ± 0.62$^{a}$ | |
| | 165 days | 1.442 ± 0.15 | 2.325 ± 0.17 | 0.921 ± 0.69 | 1.140 ± 0.31 | 1.457 ± 0.33$^{a}$ | |
| | Overall mean | 1.214 ± 0.74$^{a}$ | 1.325 ± 0.36$^{b}$ | 1.212 ± 0.55$^{a}$ | 1.278 ± 0.32$^{ab}$ | | |
| Liver function | | | | | | | |
| Alkaline-Phosphates (U/L) | 60 days at weaning | 35.978 ±1.68 | 35.732 ± 1.95 | 31.427 ± 0.95 | 45.572 ± 6.49 | 37.177 ± 2.77$^{a}$ | |
| | 90 days | 38.192 ± 2.54 | 26.992 ± 2.19 | 53.444 ± 6.13 | 54.858 ± 4.16 | 43.372 ± 3.75$^{a}$ | |
| | 105 days | 70.422 ± 2.70 | 33.026 ± 0.26 | 32.532 ± 1.63 | 53.629 ± 6.70 | 47.402±2.82$^{ab}$ | |
| | 120 days | 21.156 ± 1.61 | 93.251 ±15.16 | 58.795 ± 8.39 | 36.962 ± 4.47 | 52.541±7.41$^{ab}$ | 9-35 |
| | 135 days | 44.465 ± 3.71 | 79.705 ± 4.58 | 66.728 ± 3.10 | 62.915 ± 7.49 | 63.453±4.72$^{b}$ | (U/L) |
| | 150 days | 84.071 ±12.55 | 48.893 ±3.62 | 43.603 ± 5.37 | 77.983 ± 5.40 | 63.637±6.74$^{b}$ | |
| | 165 days | 45.549 ± 2.21 | 49.078 ± 2.53 | 102.460±12.86 | 70.480 ± 9.90 | 66.892±6.88$^{b}$ | |
| | Overall mean | 48.548 ± 3.86$^{a}$ | 52.382 ± 7.57$^{a}$ | 55.570 ± 5.49$^{a}$ | 57.485 ± 6.37$^{a}$ | | |

Table 6 (Continued).

| Blood components | Age of lamb | Treatments T1 | T2 | T3 | T4 | Overall mean | Normal range |
|---|---|---|---|---|---|---|---|
| Liver function: | | | | | | | |
| AST (U/L) | 60 days at weaning | 30.500 ± 3.14 | 28.333 ± 1.31 | 38.333 ± 1.80 | 32.133 ± 4.59 | 32.324 ± 2.71 $^{a}$ | |
| | 90 days | 21.000 ± 1.08 | 21.432 ± 1.43 | 41.468 ± 6.81 | 46.667 ± 4.31 | 32.642 ± 3.41 $^{a}$ | |
| | 105 days | 31.968± 2.42 | 35.267 ± 2.25 | 49.233 ± 2.20 | 38.467 ± 1.41 | 38.734 ± 2.07 $^{ab}$ | |
| | 120 days | 26.133± 2.48 | 31.800 ± 4.49 | 37.133 ± 3.07 | 70.832 ± 7.38 | 41.474 ± 4.36 $^{abc}$ | 26-34 (U/L) |
| | 135 days | 31.600 ± 1.49 | 35.400 ± 0.57 | 66.800 ± 12.95 | 86.000 ±10.30 | 54.950 ± 6.33 $^{bcd}$ | |
| | 150 days | 38.132 ± 2.35 | 43.267 ± 1.94 | 62.968 ± 15.32 | 95.667 ±12.14 | 60.008 ± 7.38 $^{cd}$ | |
| | 165 days | 44.133 ± 4.36 | 64.132 ±12.52 | 66.700 ±11.26 | 95.600 ± 5.83 | 67.641 ± 8.49 $^{d}$ | |
| | Overall mean | 31.924 ±2.47 $^{a}$ | 37.090 ± 3.50 $^{a}$ | 51.805 ± 7.63 $^{b}$ | 66.481± 6.57 $^{c}$ | | |
| ALT (U/L) | 60 days at weaning | 6.232 ± 0.68 | 8.532 ± 0.72 | 12.950 ± 1.40 | 11.032 ± 0.29 | 9.687 ± 0.77 $^{a}$ | |
| | 90 days | 8.867 ± 0.06 | 10.500 ± 1.77 | 10.882 ± 0.33 | 11.350 ± 0.35 | 10.400 ± 0.63 $^{a}$ | |
| | 105 days | 10.350 ± 0.55 | 8.950 ± 0.57 | 11.350 ± 0.52 | 11.017 ± 0.25 | 10.417 ± 0.47 $^{c}$ | |
| | 120 days | 9.882 ± 0.41 | 10.082 ± 0.33 | 12.950 ± 1.01 | 14.417 ± 2.09 | 11.833 ± 0.96 $^{a}$ | 20-25 (U/L |
| | 135 days | 14.532 ± 0.56 | 9.382 ± 0.80 | 20.332 ± 2.46 | 17.282 ± 1.75 | 15.382 ± 1.39 $^{b}$ | |
| | 150 days | 12.550 ± 0.31 | 12.767 ± 0.29 | 19.667 ± 0.77 | 20.000 ± 2.41 | 16.246 ± 0.95 $^{b}$ | |
| | 165 days | 21.400 ± 1.60 | 27.350 ± 3.17 | 20.467 ± 1.65 | 26.600 ± 2.22 | 23.954 ± 2.16 $^{c}$ | |
| | Overall mean | 11.973 ± 0.60 $^{a}$ | 12.509 ± 1.09 $^{a}$ | 15.514 ± 1.16 $^{b}$ | 15.597 ± 1.34 $^{b}$ | | |
| Kidney function | | | | | | | |
| Urea-N (mg/dl) | 60 days at weaning | 43.418 ± 0.41 | 37.829± 0.93 | 24.600 ± 1.29 | 38.855 ± 0.61 | 36.176 ± 0.81 $^{a}$ | |
| | 90 days | 48.180 ± 0.22 | 46.070 ± 1.88 | 39.968 ± 1.14 | 42.460 ± 1.30 | 44.170 ± 1.14 $^{b}$ | |
| | 105 days | 40.460 ± 0.63 | 48.339 ± 0.52 | 53.578 ± 1.69 | 42.012 ± 2.13 | 46.097 ± 1.24 $^{b}$ | 8-40 (mg/dl) |
| | 120 days | 45.080 ± 0.80 | 51.310 ± 0.55 | 54.473 ± 2.51 | 51.408 ± 2.01 | 50.568 ± 1.47 $^{c}$ | |
| | 135 days | 44.344 ± 0.51 | 46.610 ± 0.14 | 59.713 ± 2.66 | 52.172 ± 0.12 | 50.710 ± 0.86 $^{c}$ | |
| | 150 days | 54.409 ± 0.83 | 49.137 ± 0.78 | 58.147 ± 1.58 | 47.783 ± 1.39 | 52.369 ± 1.15 $^{c}$ | |
| | 165 days | 44.696 ± 3.01 | 56.934 ± 0.55 | 48.754 ± 1.45 | 67.252 ± 2.31 | 54.409 ± 1.83 $^{c}$ | |
| | Overall mean | 45.798 ± 0.92 $^{a}$ | 48.033 ± 0.76 $^{a}$ | 48.462 ± 1.76 $^{a}$ | 48.849 ± 1.41 $^{a}$ | | |
| Creatinine (mg/dl) | 60 days aweaning | 1.199 ± 0.25 | 1.138 ± 0.17 | 1.166 ± 0.20 | 1.119 ± 0.03 | 1.156 ± 0.16 $^{a}$ | |
| | 90 days | 1.137 ± 0.09 | 1.205 ± 0.02 | 1.146 ± 0.16 | 1.237 ± 0.16 | 1.181 ± 0.11 $^{ab}$ | |
| | 105 days | 1.176 ± 0.46 | 1.208 ± 0.21 | 1.127 ± 0.22 | 1.217 ± 0.14 | 1.182 ± 0.25 $^{ab}$ | 1.2-1.9 (mg/dl) |
| | 120 days | 1.179 ± 0.43 | 1.188 ± 0.21 | 1.222 ± 0.07 | 1.218 ± 0.01 | 1.202 ± 0.18 $^{ab}$ | |
| | 135 days | 1.196 ± 0.75 | 1.243 ± 0.21 | 1.196 ± 0.04 | 1.234 ± 0.20 | 1.217 ± 0.30 $^{ab}$ | |
| | 150 days | 1.284 ± 0.04 | 1.287 ± 0.05 | 1.177 ± 0.04 | 1.220 ± 0.05 | 1.242 ± 0.05 $^{b}$ | |
| | 165 days | 1.212 ± 0.23 | 1.258 ± 0.18 | 1.406 ± 0.03 | 1.412 ± 0.07 | 1.322 ± 0.13 $^{c}$ | |
| | Overall mean | 1.198 ± 0.32 $^{a}$ | 1.218 ± 0.15 $^{a}$ | 1.206 ± 0.11 $^{a}$ | 1.237 ± 0.09 $^{a}$ | | |

**a, b,c and d : Means in the same column or raw with different superscripts are significantly ($P<0.05$) differed.**
**T1: Untreated corn cobs (control), T2, T3 and T4, Corn cobs treated with 4% urea, , fungi and 4% urea plus fungi, respectively.**

## Blood serum parameters

### Liver function:

Concentrations of total protein, albumin and globulin for treatments T2, T3 and T4 were higher ($P<0.05$) than that of T1 (control). The A/G ratio for T1 and T3 were lower ($P<0.01$) than that of the other groups (Table 6 and Fig 1). In general, T4 recorded the highest value of serum total protein followed by T2 and T3. Bassuny *et al.* (2003) suggested that the increase in total protein and its fraction of urea plus fungal treatment may be due to the increase in nitrogen intake and its higher digestibility which would be reflected on ruminal $NH_3$-N, TVFA's and finally the blood components. There were no significant differences in the values of serum total protein between T2 and T3. Vengrin *et al.*(1981) found that adding urea for fattening bulls didn't decrease the concentration of serum total protein or change the ratio among the total protfraction. While, Khorshed (2000), Kholif *et al* (2001) and EL-Sayed *et al* (2002) found that the biological treatments increased serum total protein.

These results were parallel with values of CP in experimental rations (Table 1) and OM and CP digestibility (Table 2), which indicated better utilization of dietary protein through the digestive tract. Kumar *et al* (1980) reported that there was positive correlation between dietary protein and serum protein concentration. Values of total protein in the present study fell within the normal range (6-8/dl) reported by Recce (1991).

There were significant ($P<0.01$) differences in serum protein fraction levels among the age of lambs (duration of feeding the experimental rations) (Table 6 and Fig 2).The values were minimum at the start (60 days old) at weaning before feeding the experimental rations and they increased reaching the maximum level at day 165 after feeding, (about 32 weeks old) except for A/G ratio, which showed no significant difference between duration of feeding the experimental rations .

The albumin concentration in blood serum was significantly ($P<0.05$) lower in T1, T2 and T3 than T4 (Table 6 and Fig 1). Results are in harmony with Abdel- Aziz *et al.* (1993) who found that supplementing urea-molasses blocks or el-muffed to corn stover gave better values of albumin in plasma than those in the control rations. Khorshed (2000) and Bassuny *et al.* (2003) indicated that the values of serum albumin of animals receiving ration contained biological treated cotton stalks and corn cobs, respectively, were higher than the value of their control. It can be noticed that T4 recorded the highest ($P<0.05$) value of serum albumin followed by T2 and T3.This result my be due to the higher ($P<0.05$) digestibility of crude protein for T4 treatment than other treatments (Table 2). Rowlands (1980) reported that dietary protein could affect the concentration of serum albumin. Data indicated the normal status of liver since, the liver is main organ of albumin synthesis. Values of albumin were within the normal range obtained by Kaneko (1989) (3.5-5.0 g/dl). The present results agree with results obtained by EL-Sayed *et al.* (2002) and Bassuny *et al.*(2003).

The globulin content in blood serum had the highest ($P<0.05$) value with T4, while T1 had the lowest value (Table 6 and Fig1). Inter mediate values of serum globulin were found for T3 and T2. There was no significant difference between T2 and T3. Khorshed (2000) and Bassuny *et al.* (2003)

indicated that the values of serum globulin of ruminants fed ration subjected to biological treated cotton stalks and corn cobs, respectively, were higher than that of their control. The serum globulin concentrations (Table 6) were within the normal values indicating good immunity status of the animals.

The A/G ratio in the present study ranged from 1.212 to 1.325, showing lowest ($P<0.05$) values for treatment T3, mean while, T2 recorded the highest ($P<0.05$) value (Table 6 and Fig 1). It is important to note that all values of A/G ratio were higher than 1.0 which indicate that animals did not suffer from any health problems that might affect the performance of the experimental animals as reported by EL-Sayed *et al.* (2002). The present results are in a good agreement with Maxine (1984); EL-Ashry *et al.*(1997) and EL-Sayed *et al.* (2002) who reported that albumin tends to predominate over globulin in sheep and goats.

The alkaline-phosphatase activity in blood serum was lower in T1 (control) and the highest in T4 (Table 6 and Fig 3).Values of alkaline-phosphatase activity in T2 and T3 suggested that the biological treatment was higher than chemical treatment (55.57 and 52.38 U/L, respectively). No significant differences were found among the control and the other experimental groups. Blood parameters (Table 6) didn't show any deleterious effect on blood protein kidney or liver functions. The values obtained in the present study were within the normal range reported by Rokha (1988) which was extracted from several studies on normal sheep blood. EL-Arnary (1995) reported that the activity of alkaline-phosphatase decreased by increasing protein level in the ration. Her results obtained on ewes were lower in alkaline-phosphatase compared with the present study. Such differences may be due to sex effect. Data of alkaline-phosphatase indicated that the animals were generally under a good nutritional status and the liver was in normal physiological conditions (Blunt *et al.*, 1975).

The AST and ALT activities in blood serum of control (T1) were lower ($P<0.01$) than other treatments (Table 6 and Fig 3). Khorshed (2000) indicated that the values of serum AST and ALT activities increased after feeding ration which contained biological treated cotton stalks compared to untreated control ration. Value of serum AST activity in (T4) was higher ($P<0.01$) than T2 or T3 and of ALT than T2 (Table 6 and Fig 3) . Bassuny *et al.* (2003) suggested that the increase of serum AST and ALT in response to urea plus fungal treatment may be due to the increase of nitrogen intake and its higher digestibility which was reflected on ruminal $NH_3$-N, TVFA's and finally the blood components.

The values of serum AST and ALT obtained in present study were comparatively higher than normal range for lambs which may be due to several factors as e.g. feeding practices, genetics control, response to stress, age, liver function and body weight (Boots *et al.*, 1969). Table (6) shows that AST levels were higher than those of ALT for all experimental treatments. On the contrary, Abd EL-Kareem (1990) and EL- Ashry *et al.*(1997) found an opposite trend. In general, the values recorded for AST and ALT were within normal range reported by Abd EL-Kareem (1990), ( from 24 to 65 and from 19 to 37 unit /ml, respectively).

Serum alkaline-phosphatase, AST and ALT activities were significantly (P<0.01) affected by the age of lambs (duration of feeding the experimental rations) (Table 6 and Fig 4). The levels were minimum before starting feeding the tested rations and increased to maximum levels on day 165 after starting feeding.

**Kidney function:**

Serum urea-nitrogen concentrations of treatments T2,T3 and T4 were higher than that of T1 (control) (Table 6 and Fig 5). The combined urea and fungal treatment recorded the highest value of serum urea-nitrogen compared to either fungal or urea treatments. The results are in agreements with those obtained by Deraz (1996) who reported that the highest values of urea-N was recorded with rams fed a ration containing corn stalks treated with chemi-fungal followed by the rations containing urea treated or untreated corn cobs, respectively. El-Ashry *et al.*(1997) reported that the higher value of urea-N was obtained with ram fed a ration containing chemi-fungal treated rice straw than those fed ration containing ureated or untreated rice straw. Bassuny *et al.* (2003) found a similar trend for rams fed a ration which contained corn cobs treated with chemi-fungal, urea or untreated corn cobs, respectively. The increase in urea-N of chemi-fungal treatment may be due to the increase of nitrogen intake and its higher digestibility which were reflected on ruminal $NH_3$-N, TVFA's and finally the blood components compared to other treatments (Bassuny *et al.*, 2003). Normal levels of serum urea-nitrogen in goats ranged from 8 to 40 mg/dl (Rakha, 1985). Results of serum urea-nitrogen concentration indicated that feeding sheep on biological treated corn cobs had no adverse effect on kidney function. Results are close to those obtained by Bader (1993), El-Ashry *et al.*(1997) and EL-Sayed *et al.* (2002). The apparently normal values obtained in the present study for serum urea-nitrogen suggest efficient utilization of nitrogen in different experimental rations by rumen microorganisms.

The creatinine concentration in blood serum was lower for T1 than with other treatments (Table 6 and Fig 5). Khorshed (2000) indicated that the values of serum creatinine concentration of a ration subjected to biological treated cotton stalks were higher than value of the control. It can be noticed that T4 recorded the highest value of serum creatinine followed by T2 and T3. No significant (P<0.05) differences were found among the experimental rations. The values of serum creatinine concentration ranged from 1.198 in T1 to1.237 (mg/dl) in T4. Values of the present study were similar to those obtained by Blanch and Setchall (1960) who reported that serum creatinine ranged between 0.9 to 1.4 mg/dl in sheep blood.

The age of lambs (duration of feeding the experimental rations) had significant (P<0.01) effect on serum urea and creatinine concentration (Table 6 and Fig 6). The values progressively increased with increasing the age of lambs (duration of feeding the experimental rations)

**Economical efficiency:**

Feeding rations containing corn cobs treated with different methods (urea, fungi or urea plus fungi) improved the economic efficiency more than the control (Table 7). Treatment with urea plus fungi yielded the best economic efficiency (112.96 % in proportioned to control). The data showed that the feeding cost to produce kg gain decreased with increasing protein content (Table 1). Results of this study agree with that of Deraz (1996) who indicated that the chemi-fungal treatment decreased the cost of feed required to produced one kg live body weight.

**Table (7): Economical evaluation of the experimental rations for the growth of lambs.**

| Items | Control | | 4 % urea | treatment | Fungal | treatment | 4 % urea + | Fungal tratment |
|---|---|---|---|---|---|---|---|---|
| | Weight (kg) | Price (LE) | Weight (kg) | Price (LE) | Weight (kg) | Price (LE) | Weight (kg) | Price (LE) |
| Initial weight (kg) | 19.75 | 95.0 | 19.50 | 95.0 | 19.75 | 95 | 19.25 | 95 |
| Final weight (kg) | 44.75 | 581.75 | 45.00 | 585.00 | 45.75 | 594.75 | 48.25 | 627.25 |
| Total gain | 25.00 | | 25.500 | | 26 | | 29.00 | |
| Feed intake : | | | | | | | | |
| Concentrate | 159.07 | 154.30 | 169.72 | 164.63 | 162.40 | 157.53 | 158.94 | 154.17 |
| Corn cobs | 100.83 | 30.25 | 105.30 | 31.59 | 108.23 | 32.47 | 111.11 | 33.33 |
| Total feed cost/lamb | | 184.55 | | 196.22 | | 190.00 | | 187.50 |
| Cost of kg gain/lamb | | 7.38 | | 7.69 | | 7.31 | | 6.47 |
| Total cost gain | | 279.55 | | 291.22 | | 285.00 | | 282.50 |
| Net revanue lamb | | 301.45 | | 293.78 | | 309.75 | | 344.75 |
| Economic efficiency (EE) | | 1.08 | | 1.01 | | 1.09 | | 1.22 |
| Relative EE% of control | | 100 | | 39.52 | | 100.93 | | 112.96 |

**Where EE relative control.**

**Price / kg live weight (L.E) 13.0 ( The price according to prices of Animal Production Research Institute).**

**CFM = 970 LE ton** **Corn cobs = 300 LE ton**

## CONCLUSION

Results obtained in this study showed that urea plus fungi treatment showed the best digestibilities of most nutrients, nutritive values, feed intake, live body weight and economic efficiency. It also kept most of blood serum parameters tested were within the normal range. Therefore, using corn cobs treated with urea plus fungi in lamb nutrition could be recommended as good feed quality and possible replacement of traditional roughage and part of concentrates.

### Implications :

Results obtained in this study show that the chemical and chemical plus fungi treatments improved the digestibility coefficients and reduce the cost of DCP than untreated roughages. It has several practical advantage such as increasing protein content of roughages, increasing both protein and fiber digestibility and hence increasing overall feeding value of roughages.

This study practically showed, that the biological treatments are always preferable since they avoid the hazard of possible environmental pollution associated with chemical treatments and could be practically applied at farm level for feeding animals.

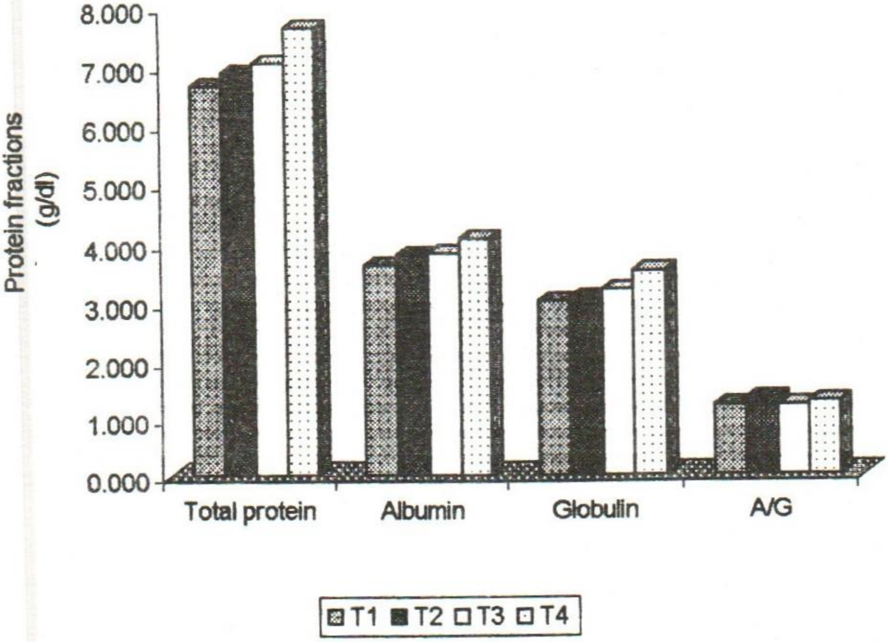


Figure (1) Serum protein fraction overall mean values as affected by dietary treatments.

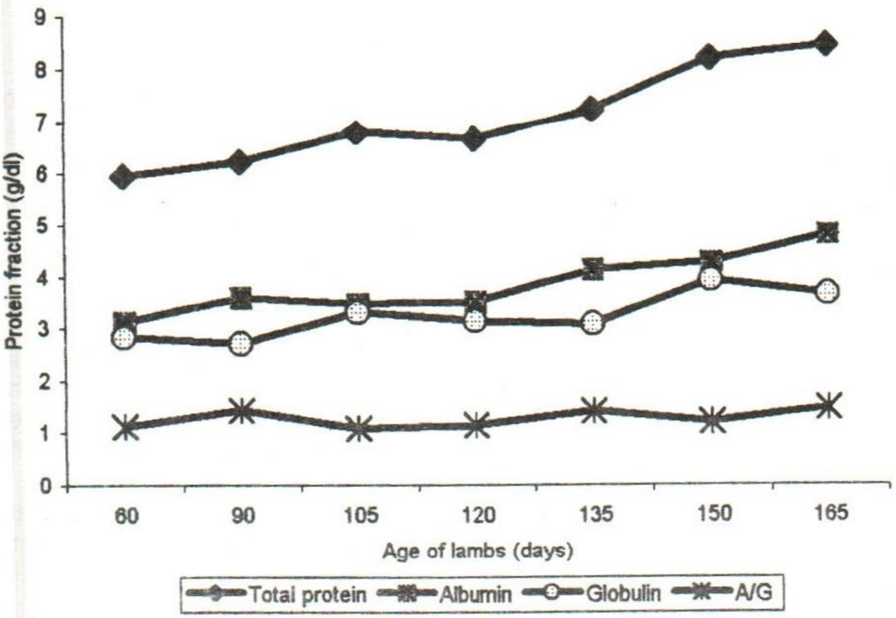


Figure (2) Serum protein fraction overall mean values as affected by age of lambs.

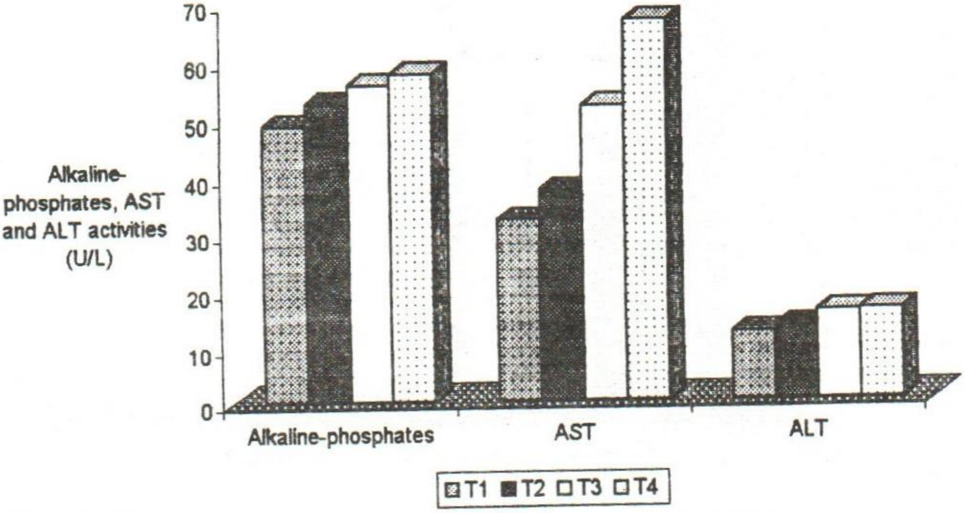


Figure (3) Serum alkaline-phosphate, AST and ALT overall mean activities as affected by dietary treatments

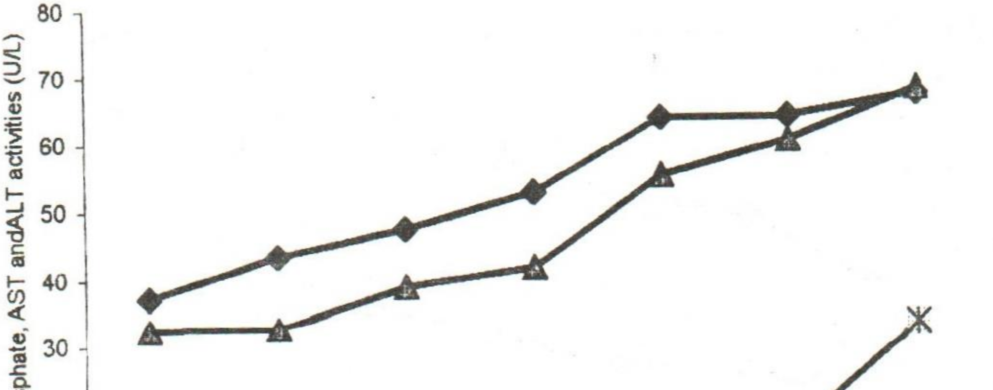


Figure (4) Serum alkaline-phosphate, AST and ALT overall mean activities as affected by age of lambs

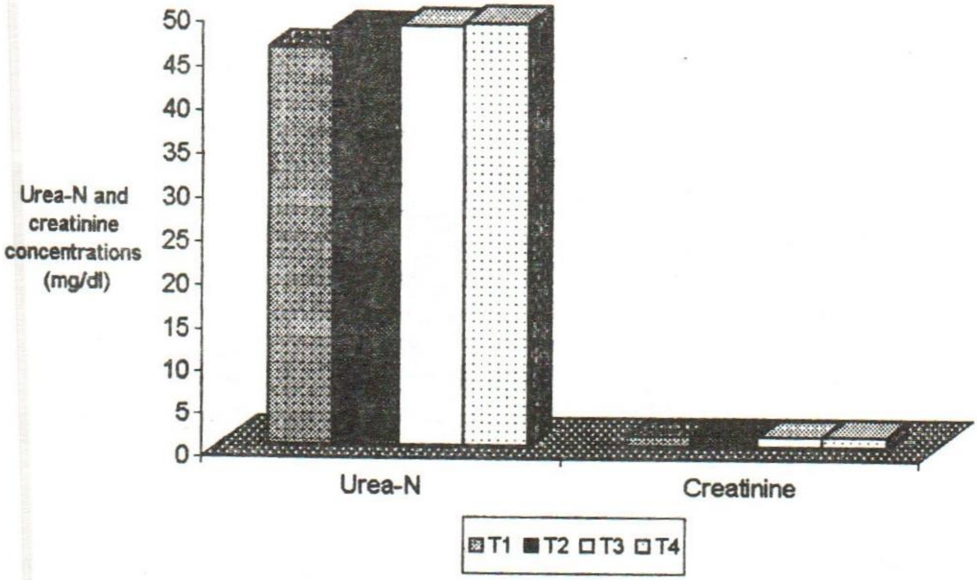


**Figure (5) Serum urea-N and creatinine overall mean concentrations as affected by dietary treatments**

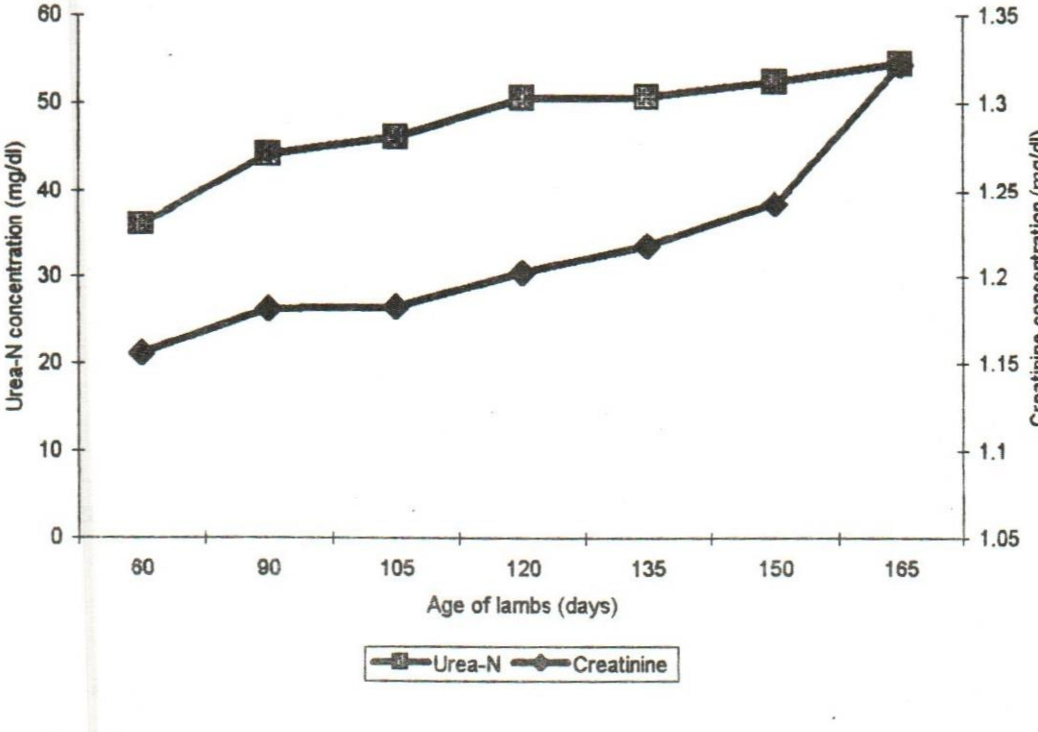


Figure (6) Serum urea-N and creatinine overall mean concentrations as affected by age of lambs.

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# تأثير استخدام المعاملات الكمياوية والبيولوجية لقــوا لــح الــذرة علــى الأداء الإنتاجي للأغنام.

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استخدم في هذه الدراسة ١٦ من ذكور حملان خليط السافولك (سافولك X أوسيمى ) فى عمر ٨ أسابيع متوسط وزن ١٩,٧٥ كجم حتى عمر ٣٢ أسبوع . قسمت الحيوانات عشوائيا إلى أربــع مجموعــات تجريبية لدراسة تأثير المعاملات البيولوجية والكيماوية على معاملات الهضم والقيمة الهضمية ومعدلات النمو للحملان ومقاييس الدم ، وقد تم تغذية الحوالى لحد الشبع على قوا لح الذرة المعاملة والغير معاملة كما غذيت الحيوانات جميعا على ٦٠ % مخلوط علف مركز طبقا لمقررات NRC عــام ١٩٨٩ وكانــت المعــاملات لقوالح الذرة كالآتي:

١- قوا لح الذرة غير معاملة ( مجموعة معاملة).
٢- قوا لح الذرة المعاملة بـــ ٤% يوريا.
٣- قوا لح الذرة المعاملة بالفطر. .
٤- قوا لح الذرة المعاملة بالفطر + يوريا.

**وكانت النتائج كالآتي:**

١- أدت المعاملة باليوريا + الفطر إلى زيادة معنوية في محتوى المادة الجافة والمادة العضوية و البـــروتين الخام والألياف الخام مقارنته الكنترول.
٢- زادت معاملات هضم المادة الجافة والمادة العضوية والبروتين الخام والألياف الخــام زيــادة معنويــة نتيجة المعاملة باليوريا + الفطر أو المعاملة بالفطر مقارنتا بالمعاملة باليوريا والكنترول.
٣- تأثرت القيمة الغذائية ( مجموع المركبات الكلية المهضومة ومعدل النشا والبروتين الخــام المهضــوم) معنويا وكانت أعلى قيمة لها مع المعاملة باليوريا + الفطر مقارنته مع المعاملات الأخرى.
٤- أظهرت النتائج عدم وجود أي فروق معنوية بين المعاملات في معدل النمو اليومي للحملان . وكانــت الزيادة االكلية في الوزن متساوية تقريبا (٢٥ ،٢٦، ٢٥,٥ كجم ) للمعاملة الأولى والثانية والثالثة علــى التوالي ، بينما أظهرت المعاملة الرابعة (يوريا + الفطر) أعلى معدل نمو كلى (٢٩ كجم) مع أفضــل كفاءة تحويلية (٩,٣٦ مادة جافة /كجم زيادة في الوزن ). وكانت الكفاءة الاقتصادية للمعاملة الأخيــرة أفضل من كل المعاملات.
٥- بالنسبة لقياسات الدم أظهرت النتائج تأثير معنوي على كل من البروتين الكلى ، الألبومين ، الجلوبيولين وأنزيمات الكبد. وغير معنوىعلى كل من اليوريا ، الكرياتين وأنزيم الفوسفاتيز القاعدي بين المعاملات المختلفة مقارنة بالكنترول.
٦- سجلت أعلى قيمة معنوية للبروتين الكلى الألبومين والجلوبيولين ونتروجين اليوريا والكرياتينين وأنزيم الفوسفاتيز القاعدي وأنزيمات الكبد مع المعاملة باليوريا + الفطر يليها المعاملة بالفطر مقارنة بالكنترول والمعاملة باليوريا فقط. وكانت هذه المقاييس في الحدود الطبيعية ولم تؤثر على الصحة العامة للحيوان.

يستنتج من هذه الدراسة أنة يمكن التوصية باستخدام المعاملة باليوريا + الفطر كأفضل المعاملات لقوا لح الذرة عند استخدامها في تغذية المجترات حيث حسنت من معاملات الهضم والقيمة الهضمية والزيادة اليومية في الوزن ومعامل التحويل الغذائي والكفاءة الاقتصادية للحملان النامية ومقاييس الدم . بالتالي يمكــن استخدام قوا لح الذرة المعاملة باليوريا + الفطر في تقليل تكلفة تغذية الحيوانات المجترة .