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# UREA AND POOR QUALITY ROUGHAGE IN FATTENING RATIONS FOR BUFFALO MALES

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**Summary**

Eighteen Egyptian uncastrated buffalo males 1.5-2 years old were used in the experiment. Animals were distributed into three groups of six heads in each to study the effect of substitution up to approximately 30% of total protein in rations containing large amounts of poor quality roughages by N. P. N.

Results obtained during 124 days experimental periods showed that the rate of gain varied in very narrow range (761-807 gm/day) in the different groups. Gradual increase in urea levels to supplement the ration favoured N utilization and efficiency of feed conversion. Differences were found to be insignificant. No significant differences were also obtained in the efficiency of feed utilization between the control and the experimental animals receiving about 30% of the nitrogen required as a urea nitrogen. No adverse effects were noticed as the level of urea reached its maximum of 65 gm daily per head, which replaced more than the digested N of 1.4 kg. Co-op feed mixture. These results insured that the urea nitrogen in fattening ration for buffalo males has not definitely been proved to be inferior to the proteins of plant sources.

## Introduction

Urea has been approved as a propritary feed ingredient (Pearson and Smith, 1943). Urea and other ammonia salts are converted into microbial protein (protein of high quality) in the rumen by symbiotic action of microflora. Numerous studies have demonstrated the value of urea and other NPN in grain rations.

Harris *et al.* (1943) found that the ammonia concentration declined while the protein content increased in the rumen liquor. Such results insure the synthesis of ammonia N into microbial protein which is available to the host animal. After the death of these microorganisms, their cells are subjected to digestive juices of the abomasum and small intestine leading to the production of amino acids.

Only after 4 days of feeding sheep on a low protein ration, containing labelled urea ($N^{15}$), a considerable concentration of $N^{15}$ was detected in (the structure of) protein and non-protein compounds of the tissues of liver and kidney (Watson *et al.*, 1949)

The ration nitrogen (protein and non-protein compounds) is the main source of the free ammonia in rumen. The enzymes which are involved in the hydrolyses of the different nitrogenous compounds are secreted by ruminal bacteria and infusoria.

Different experiments have shown that the addition of NPN or protein to poor quality roughage markedly increases the daily intake; some workers have noticed that the addition of NPN to such rations was accompanied by increases in digestibility of the ingested dry matter. Such results could be explained as it is well known that a high concentration of ammonia nitrogen in the rumen content is always accompanied by active growth and multiplication of the cellulolytic bacteria as compared by its activity when the concentration of ammonia nitrogen in the rumen is lower.

Of course the protein content of wheat straw is too low to supply the necessary level of nitrogen for normal microbiological activity and growth.

Egan (1965) found that supplementing poor quality roughage with NPN improved protein metabolic status in animals, as a result of increased absorption of amino acids and the nitrogen retention in body.

The objectives of this work were to study rate of growth and feed efficiency as affected by substitution up to 30% of the total protein in rations (relatively) containing large amounts of poor quality roughage by urea nitrogen.

## Materials and Methods

Eighteen Egyptian uncastrated buffalo males 18 - 20 months old were used in this experiment. The animals were distributed according to their body weights into three groups of six heads in each. The experimental rations were distributed at random. The experiment continued for 124 days, divided into two periods :

During the first experimental period which extended 44 days the diets shown in Table 1. were fed.

During the second experimental period which extended 80 days the animals were fed the finishing rations shown in Table 2.

Each animal received from 40 - 45 gm common salts daily. The daily feed was performed in the following manner : Co-op feed and corn with or without urea at 10 am. and 2 p.m., while the rice straw was given at 8 a.m. and 3.30 p.m.

All experimental animals were weighted biweekly.

TABLE 1

**Daily amount of feed per head**

| Ingredients | | Group 1 | Group 2 | Group 3 |
|---|---|---|---|---|
| Co-op feed mixture | kg | 2.50 | 1.00 | 2.00 |
| Corn | kg | 2.00 | 3.00 | 3.00 |
| Rice straw | kg | 6.00 | 6.00 | 4.00 |
| Urea | gm | — | 42.00 | 26.00 |
| Total starch equivalent | kg | 4.35 | 4.40 | 4.40 |
| Digestible protein in ration | gm | 460.00 | 473.00 | 550.00 |
| Total digestible nitrogen | gm | 73.60 | 75.80 | 88.00 |
| Digestible nitrogen of urea | gm | — | 18.06 | 11.18 |
| Percentage of nitrogen in ration according to the control | | 100% | 103% | 119.6% |
| Urea nitrogen: total nitrogen in ration | | — | 23.8% | 12.7% |

Co-op feed mixture contains 50 % SE, 12 % DP
Corn contains 80 % SE, 8 % DP
Rice straw contains 25 % SE, 0 % DP
Urea contains 43 % DP Digestible nitrogen.

TABLE 2

**Daily amount of feed per head (Second experimental period)**

| Ingredients | | Group 1 | Group 2 | Group 3 |
|---|---|---|---|---|
| Co-op feed mixture | kg | 3.00 | 1.00 | 2.00 |
| Corn | kg | 2.50 | 3.75 | 3.50 |
| Rice straw | kg | 6.00 | 6.00 | 4.00 |
| Urea | gm | — | 65.00 | 62.00 |
| Total starch equivalent | kg | 5.00 | 5.00 | 4.80 |
| Digestible crude protein in ration | gm | 560.00 | 595.00 | 686.00 |
| Total digestible nitrogen | gm | 89.50 | 95.20 | 109.50 |
| Percentage of the nitrogen in ration according to the control | | 100% | 106% | 122% |
| Urea N : Total nitrogen in ration | | — | 29.4% | 24.4% |

## Results and Discussion

The average of body weight and the rate of gain in the three groups during the two experimental periods are shown in Table 3.

TABLE 3

The average body weight of the different groups during 124 days experiment (Kg.)

| Date | 1st experimental period | | | | 2nd experimental period | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 6/X | 20/X | 3/XI | 18/XI | 2/XII | 6/XII | 30/XII | 13/I | 27/I | 6/II |
| Group | | | | | | | | | | |
| I Control . . . . | 281.0 | 300.0 | 309.0 | 320.5 | 326.0 | 330.0 | 347.8 | 354.5 | 369.0 | 379.1 |
| II . . . . . | 284.2 | 295.4 | 306.4 | 312.0 | 319.0 | 326.0 | 344.0 | 347.4 | 361.8 | 378.6 |
| III . . . . . | 281.1 | 294.5 | 312.0 | 316.5 | 325.0 | 325.0 | 351.1 | 355.3 | 368.3 | 381.16 |

The total body weight gain during 124 days experiment were 98.00 94.40 and 100.06 Kg in the first, second and third groups respectively.

The average gain in body weight of the three groups during the first 44 days of the experiment were 895; 632 and 805 gm, while during the following 80 days were 733; 823 and 808 gm. per head in the first, second, and third groups respectively (Table 4).

TABLE 4

**Daily average gain in body weight**

| Group | First period (44 days) | | Second period (80 days) | |
|---|---|---|---|---|
| | Total gain kg. | Daily gain gm | Total gain kg. | Daily gain gm. |
| I . . . . . | 39.4 | 895.45 | 58.60 | 732.50 |
| II . . . . . | 27.8 | 631.82 | 66.60 | 832.50 |
| III . . . . . | 35.4 | 804.54 | 64.66 | 808.25 |

The average daily gain obtained in this work was higher compared to those reported by Ragab and Abdel Salam (1962) on the growing male buffaloes where the gain was 0.659; 0.457; 0.389; 0.553 and 0.445 Kg during the different periods from birth - 4; 4-6; 6-12; 12-18 and 18-24 months of age. Also, the average daily gain of fattening buffalo calves from 18-24 months of age was 0.50 Kg (Ragab *et al.*, 1966), while it was found by Ghoneim *et al* (1957) that the averages daily gain in buffaloes were 0.52, 0.46 and 0.61 Kg for the periods from birth to 6 months, 6-12 and 12-18 months.

In the second group there has been a remarkable increase in daily gain during the second experimental period as compared with that obtained during the first one.

This change was accompanied by a noticeable increase in feed efficiency (Table 5).

The results represented in Table 5 show that the highest rate of gain and the highest feed efficiency were achieved in the third group, where the N required for the unit of gain was slightly higher. Such results may be interpreted by the possibility that the rations rich in nitrogen caused activation of microorganisms, which was accompanied by improved digestibility and increased feed efficiency. The nitrogen efficiency varied inversely with the nitrogen level in rations. The lowest feed efficiency was noticed in the first experimental period for animals of the second group.

TABLE 5

Feed efficiency during the experimental periods.

| Group | First experimental period | | | | | Second experimental period | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Average daily intake | | Average daily gain | Efficiency | | Average daily intake | | Average daily gain | Efficiency | |
| | S.E. Kg | Protein gm | gm | * S.E. Kg | ** N gm | S.E. Kg | Protein gm | gm | S.E. Kg | N gm |
| I . . . . . | 4.35 | 460 | 895.45 | 4.86 | 82.20 | 5.0 | 580 | 732.5 | 6.84 | 126.86 |
| II . . . . . | 4.40 | 475 | 631.82 | 6.96 | 120.29 | 5.0 | 600 | 832.5 | 6.01 | 115.31 |
| III . . . . . | 4.40 | 546 | 804.54 | 5.48 | 108.5 | 4.8 | 657 | 808.25 | 5.94 | 130.00 |

* The feed efficiency was calculated as Kg. S.E required for 1 Kg. gain in body weight.

** The efficiency of N utilization was calculated as gm N required for 1 Kg. gain in body weight.

TABLE 6

Feed intake, efficiency and costs of 1 Kg gain buffalo males.

| Group | Daily gain during 124 exp. period gm | Average ration daily | | | | Feeds / 1 Kg. gain | | | | S.E/ 1 Kg. gain | Costs in P.T. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Co-op feed Kg | Corn Kg | Rice straw Kg | Urea gm | Co-op feed Kg | Corn Kg | Rice straw Kg | Urea gm | | |
| I . . . | 790.31 | 2.75 | 2.3 | 6 | — | 3.46 | 2.90 | 7.6 | — | 6.03 | 15.1 |
| II . . | 761.29 | 1.00 | 3.5 | 6 | 56 | 1.32 | 4.60 | 7.91 | 73 | 6.27 | 20.6 |
| III . . . | 806.94 | 2.00 | 3.32 | 4 | 49 | 2.48 | 4.10 | 4.96 | 61 | 5.77 | 16.4 |

This could be attributed to the decrease of feed digestibility as a result of the change in the ingredients and the replacement of as much as 23.8% of the protein by urea. Such a shift might have affected the microbial activity in the rumen. After the stabilization of microflora the efficiency increased in animals of the second group during the second experimental period approaching that of the third group.

As shown in Table 6 the efficiency of feed utilization in the first, second and third groups during the whole experiment are not significantly different. Starch equivalent units required for the production of 1 Kg body gain seems to be lower as compared by those obtained by different workers used buffalo males in the same period of age.

The highest costs for 1 Kg gain was attained in the second group. This could be explained by the high price of corn used in relatively high proportion as a feed stuff with a wide nutritive ratio to cover the energy requirements with the minimum amounts of nitrogen offered as a nitrogen of a natural protein source.

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# اليوريا والاعلاف الخشنة منخفضة الجودة
# فى علائق تسمين ذكور الجاموس

## الملخص

استخدمت فى هذه التجربة ثمانية عشر ذكور جاموس غير مخصية فى عمر ١ر٥ ـ ٢ سنة أجرى تقسيمها الى ثلاث مجاميع فى كل منها ٦ حيوانات وذلك لدراسة اثر الاستبدال الجزيئى للاحتياجات البروتينية فى علائقها بالنتروجين غير البروتينى الذى وصلت أقصى نسبة له ٣٠ ٪ من المقررات وذلك فى علائق تحتوى على نسبة عالية من الأعلاف المالئة منخفضة الجودة ٠

وقد أظهرت نتائج التجارب التى استمرت ١٢٤ يوما ان متوسط معدل الزيادة اليومية كان متقاربا من المجاميع المختلفة الى حد كبير ( ٧٦١ ـ ٨٠٧ جرام ) هذه الفروق غير معنوية ٠

كذلك لم تلاحظ فروق معنوية فى الكفاءة التحويلية للمركبات الغذائية فى مجموعة المقارنة والمجاميع التجريبية التى تم استبدال ٣٠٪ من بروتيناتها بنترجين يوريا ٠

وتؤكد هذه النتائج أن آزوت اليوريا فى علائق تسمين ذكور الجاموس كانت على قدم المساواة مع البروتينات النباتية التى استخدمت فى علائق الحيوانات المقارنة ٠