Egypt. J. Anim. Prod. 21, No. 2, pp. 155—161 (1981)

Effect of Feeding Different Levels of Urea on the Production Performance of Milking Buffaloes

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EIGHTEEN lactating buffaloes were used to test the effect of feeding different levels of urea on their productive performance. Three levels of urea (treatments A, B and C) were used : 0, 1.6 and 2.3% of the diet (equivalent to 0, 35 and 50% of the digestible-N requirements). The experiment lasted for 93 days. Each treatment period consisted of a 10-day-preliminary and 21-day test periods. A 3 × 3 latin square design with six replicates was employed. Milk samples were analyzed for SNF, fat, protein, ash and NPN. Rumen and blood serum samples were analyzed for NH_3-N, NPN, total-N, urea and VFA's.

The results showed that average daily milk and fat yields and percent of fat in milk did not differ significantly ($P > 0.05$) among treatments. The values were : 6.7, 5.5 and 6.7 kg ; 10.1, 9.3 and 9.5 kg; 7.7, 7.4 and 7.2% for treatments A, B and C, respectively. Values for rumen fluid and blood serum traits were not affected by treatments. Feed efficiency and body weight were also unaffected by the level of urea in the ration.

It was concluded that urea-N could successfully replace up to 50% of the digestible nitrogen requirements of lactating buffaloes without hindering the productive performance.

The ability of the ruminant to utilize urea-N for microbial protein synthesis and, therefore, production, has long been recognized. Of considerable importance when urea is fed to ruminants, is that it furnishes nitrogen at a lower cost than do plant proteins.

As regard the value of urea in rations for lactating animals, contradictory reports are found in the literature. While Armstrong and Trinder (1966) and O'Donovan *et al.* (1973) found that kilk yield of urea-fed cows were inferior to those fed intact protein. Briggs *et al.* (1970) have reported no effect on either milk or fat yield.

Studies on the utilization of urea by milking buffaloes are very limited. Therefore, this work was designed to test the effect of feeding different levels of urea on the productive performance, rumen and blood traits of native buffaloes.

Material and Methods

Eighteen lactating buffaloes were used in this study which lasted for 93 days divided on three periods, each consisted of 10-days preliminary and 21-days experimental. Three nutritional treatments were employed *viz.* 0, 1.6 and 2.3% of the total ration as urea (equal to 0, 35 and 50% of the digestible nitrogen requirement). Animals were assigned to treatments on the basis of milk production, lactation season and time of calving. The basic design was a 3 × 3 latin square (three treatments and three periods) with six replicates. Animals were housed in a kind of a tail-to-tail pens, fed individually and machine-milked twice daily. Water was available at all times.

The ingredients that make up the rations are presented in Table 1. Concentrates were given in a pelleted form. Rice straw was the main source of roughage. Feed intake and milk yield was recorded daily. At the end of each experimental period, proximate

Table 1. Rations ingredients (%) and their chemical composition

Ingredients	Treatments(urea levels, of digestible-N requirements).[1]			Chemical composition, %		
	0 (A)	20.4(B)	50(C)	DM	CP	CF
Extr. U.D.C.S.M.[2]	45.0	20.4	4.7	92.6	25.1	25.2
Rice bran	15.0	20.0	20.0	92.8	13.5	8.4
Yellow corn	15.0	30.0	40.0	91.0	7.5	2.1
Wheat bran	17.0	20.0	25.0	91.0	12.0	8.5
Molasses, cane	5.0	5.0	5.0	22.0	0.0	0.0
Urea	0.0	1.6	2.3	99.97	287.5	0.0
Salt	1.0	1.0	1.0	—	—	—
Lime stone	2.0	2.0	2.0	—	—	—
Rice straw				92.6	3.3	35.0

1, Animals requirements of SE & DP were those recommended by Shehata, O.(see Khattab, et al., 1971).

2, Extracted, undecorticated cotton seed meal.

analysis of milk was done for each animal. Rumen fluid samples (via stomach tube) and blood samples (jugular vein) were taken two animals from each treatment at 0, 2 and 4 hr of feeding. Rumen samples were analyzed for ammonia-N (Conway, 1957), PN and NPN (A.O.A.C., 1965) and VFA's (Petroonkina, 1961). Blood samples were analyzed for PN, NPN and urea (Conway, 1975), Body weight changes were also recorded every week.

The data obtained were analyzed statistically according to Snedecor and Cochran (1967).

Results and Discussion

The animals in the three treatments consumed their allowances of concentrates and roughages without any residues. No palatabiltiy problems were observed even at the highest level of urea given (2.3% of the ration). Maximum consumption of urea was 287 g/head/day.

In Table 2, the production performance data and analysis of milk are given. No significant differences (P 0.05) were observed among treatments as regard milk or FCM yield. However, there was a slight tendency toward a decrease in FCM yield with the increase in urea level; 10.1, 9.8 and 9.5 kg for treatments A, B and C, respectively. The results are in close agreement with those of Singh and Donker (1961). Khattab *et al.* (1970), Plummer *et al.* (1971), Tylecek and Herik (1971) and Simanenkov and Medvedev (1974) who found that the inclusion of urea in rations of dairy cows up to 40% of their N requirements, did not affect significantly milk or fat yield.

Percent fat, protein, ash SNF, and NPN in milk was not significantly affected by treatment (Table 2), although milk fat and SNF % decreased with the increase in the level of urea. Van Horn *et al.* (1967), Khattab *et al.* (1971) and Vignon and Lauran (1974) reported the same results with dairy cows.

Data regarding analysis of rumen fluid and blood serum are shown in Table 3. None of the traits examined was significantly affected (affect) by the level of urea in the diet. Rumen ammonia increased by 3 mg % and rumen NPN decreased by 5 mg %, with

Table 2. Averages of milk and fat yield and composition of milk in different treatments

Item	Treatments (A) 0	(B) 35	(C) 50	SE[1]
Milk yield, kg/day	6.7	6.5	6.7	0.11
FCM, kg/day	10.1	9.8	9.5	0.22
Composition of milk, %				
Fat	7.7	7.4	7.2	0.26
SNF	9.5	9.4	9.3	0.78
Protein	4.7	4.7	4.6	
Ash	0.76	0.81	0.78	0.02
PN	0.74	0.74	0.72	0.08
NPN	0.07	0.07	0.07	0.003

1, Standard error of treatments mean.

the increase in urea level in the diet, from 0 to 2.3 %. Rumen VFA concentration remained at the level of 8 m. equv./100 ml in the three treatments. Blood urea increased by 1 mg % when urea was included in the diet. Sharma *et al.* (1973) reported that neither blood urea nor rumen VFA or NPN were affected by urea in the diet of lactating cows.

Feed efficiency was calculated as kg of SE (starch equivalent) to produce one kg of 4% FCM. The values were 0.32, 0.33 and 0.34 for the control animals and those receiving 1.6 and 2.3% urea in their diets. The same results were reported by Holter *et al.* (1968), Tylecek and Herik (1971) and Senel (1974).

No evidence was found to support the contention that feeding high levels of urea has an adverse effect on live body weight of the animals.

Table 3. Averages of rumen fluid and blood serum traits in different treatments.

Item	Treatments(urea levels) (A) 0	(B) 35	(C) 50	SE
Rumen fluid traits, mg per 100 ml				
Ammonia-N	18.3	19.9	21.3	1.1
PN	47.2	40.3	41.1	3.4
NPN	54.0	53.2	49.4	2.8
NH_3-N/Total-N,%	19.1	19.5	22.2	1.2
VFA,m equiv./100ml.	8.0	8.1	8.1	0.27
Blood serum traits, mg per 100 ml.				
NPN	550.0	48.0	53.0	2.5
Urea	34.0	35.0	35.0	1.3
PN	1.10	1.11	1.06	0.02

From this study, it is warranted to conclude that production performance of lactating buffaloes is not affected by the inclusion of as high as 2.3% of the diet as urea. Also, feeding urea at this level has no effect on body weight change, rumen VFA or rumen and blood nitrogen.

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تأثير التغذية على مستويات مختلفة من اليـوريا على الاداء الانتاجى للجاموس الحلابة

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استخدم فى هذا البحث ١٨ جاموسة حلابة لدراسة تأثير التغذية على ثلاث مستويات من اليوريا على انتاجها من اللبن وتركيبه ـ قسمت الحيوانات الى ٣ مجموعات وتغذت على مستويات : صفر ، ٦ر١ر٣ر٢٪ من الغذاء يوريا ـ استمرت التجربة ٩٣ يوما وتم تحليل عينات من اللبن وسائل الكرش ومن الدم .

وقد اظهرت النتائج ان متوسط انتاج اللبن اليومى وكمية الدهن لم تتأثر معنويا بالمعاملة الغذائية كذلك فان الازوت الكلى ، الازوت غير البروتينى ومجموعة الاحماض الدهنية الطيارة فى الكرش ـ وكذلك يوريا الدم لم تتأثر بالمعاملة الغذائية .

يستخلص من البحث انه يمكن اضافة اليوريا الى علائق الجاموس الحلاب بدون التأثير على انتاجه بنسب تصل الى ٣ر٢٪ من الغـذاء وهى تساوى ٥٠٪ من احتياجات البروتين المهضوم للحيوان .