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Extruded urea in the diet of finished steers in feedlot[1]

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Abstract: It was aimed to evaluate diets containing increasing levels of extruded urea on performance, the carcass characteristics of Nellore steers finished in confinement. Twenty- four 22 months old Nellore castrated steers with initial body weight of 333.52 kg were used. A completely randomized design was used with four treatments: 50, 60, 70 and 80 g/100 kg of BW and sis repetitions by treatment; with 40:60 roughage:concentrate ration. Whole plant corn silage as roughage was used. There was effect of extruded urea levels on final weight, total weight gain and average daily gain, treatments containing 50, 60 and 70 g/100 kg BW did not differ statistically and higher than treatment with 80 g/100 kg BW. There was no effect among the treatments for carcass yield and subcutaneous fat thickness. Extruded urea can be used without impairing the productive performance of steers finished in confinement We recommend the use of extruded urea in up to 70 g/100 kg BW.

Keywords: castrated, NNP, performance, protein, weight gain

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Introduction

Nitrogen is recognized as an essential element for animals many years ago. The use of non-protein nitrogen (NNP) in ruminant nutrition originated in 1879 in Germany, sending that in 1939 participated in the feeding of animals in the United States (Maynard et al., 1984, HUNTINGTON and ARCHIBEQUE, 1999). The NNP is not protein, in other words, are not amino acids assembled by peptidic bonds and exist both in animals and in plants. Although there is a variety of NNP compound (composed of purina and pyrimidines, urea, biuret, uric acid, glycosides nitrogen, alkaloids, ammonium salts and nitrates), urea because of cost, availability and employment, is one of the most used. Urea has specific characteristics: it is deficient in all minerals, has no energy value of its own;

It is extremely soluble and in the rumen is quickly converted into ammonia, however if supplied in high doses can cause toxicity (MAYNARD et al., 1984). In this way, protein is one of the highest cost ingredients in the animal diet and the production economy is highly dependent on protein utilization efficiency. Alternatives such as the substitution of food source containing true protein, such as soy bran, for foods with higher nitrogen content (NNP), such as urea, could improve financial effectiveness, include more food energy and fodder, as ruminants have the ability to synthesize NNP in high biological value microbial protein in synch with the available carbohydrate. The NRC (2001) cites that PDR from NNP sources such as urea are as effective as true protein sources for the formation of microbial protein. The protected urea, which is more slowly hydrolyzed to N-NH 3 than vulnerable urea may be more efficiently used by the microorganisms in the rumen. The increase in the use of urea as a source of NNP has been highlighted by the development of industrial processes capable of reducing the degradation rate of urea in the rumen (HARRISON et al., 2008), as well as by the extrusion process. The objective of this work was to evaluate diets containing increasing levels of extruded urea on performance, the carcass characteristics of Nellore steers finished in confinement.

Material and Methods

The experiment was carried out at the Farm school of FAMEZ/UFMS, located in the municipality of Terenos-MS. Twenty-four (24) Nelore castrated calves were used with approximately 330 kg live weight, distributed in four treatments with six repetitions per treatment. The animals, identified, vaccinated and wormed, come from the flock of the farm School of FAMEZ/UFMS.

Table 1 - Percentage of ingredients containing increasing levels of Urea Extruded in the diet of finished calves in confinement.

	Extruded Urea (g/100 kg PV)			
	50	60	70	80
Corn silage	40.00	40.00	40.00	40.00
Extruded urea *	1.95	2.34	2.73	3.11
Corn	47.20	48.63	50.06	51.50
Soy Bran	7.63	5.81	3.98	2.17
Mineral	3.22	3.22	3.22	3.22
Total	100.00	100.00	100.00	100.00

*Amireia-200S (Pajoara Industria e Comércio Ltda, Campo Grande –MS)

The experiment was divided in 4 experimental periods of 28 days, comprising five weighings, one being an initial and the other every 28 days totaling 119 days of confinement. Adaptation of the animals to the diets, a pre-experimental period of 14 days was adopted. The animals were kept in individual stalls, with feedings once a day at 8:00 AM, to keep leftovers around 5% of the supply. The water consumption was ad libitum.

The treatments comprised increasing levels of extruded urea (50, 60, 70 and 80 g/100 kg PV). At the end of the experimental period, the animals were fasted for 24 hours and then slaughtered in a refrigerator. Immediately after slaughter, the carcass were weighed, the carcass yield determined and stored in a cold room at 2°C until the following morning, where the fat thickness (CGE) evaluations between the 12th and 13th ribs of the right half carcass. It was used the fully randomized experimental design with 6 repetitions per treatment, for the variables initial weight, final weight, average daily gain, total weight gain, carcass yield and subcutaneous fat thickness. The statistical analysis was based on the Tukey test, at 5% probability.

Resultados e Discussão

There were levels effects (P<0.05) for the final live weight variables, total weight gain and daily average gain. Since the treatment containing 80g/100 kg PV showed less performance when compared to the other levels (table 2). The use of levels containing 50, 60 and 70g/100 kg PV, were similar to final live weight (463.10 kg), total weight gain (130.80 kg) and daily average gain (1.10 kg) demonstrating that the use of up to 70g/100 kg PV can be used without occasion lower efficiency.

The diets were formulated according to the NRC (1996) for an average gain of 1.2 kg/day, where the obtained results had a difference of 8.61% lower to the estimated levels up to 70g/100 kg PV. Azevedo et al, (2005) studying the effect of the replacement of the crude protein from the soy bran by the slow-release urea (Optigen II, Alltech, Nicholasville, KY, USA) on the performance of Nelore Bovines finished in feedlot, obtained average gains of 1,11kg, results similar to those obtained in this work with levels up to 70g/100 kg PV.

There was no effect (P>0.05) of the extruded urea level for the carcass yield variables (RC) with an average of 53.16% and subcutaneous fat thickness (SF) with an average of 5,31mm. Irrespective of the level of extruded urea used from 50 up to 80g/100 kg PV, they did not influence housing yield and subcutaneous fat thickness. The use of up to 80g/100 kg PV can be used without negative effects for housing yield and subcutaneous fat thickness. The use of up to 80g/100 kg PV can be used without negative effects for housing yield and subcutaneous fat thickness.

Table 2. Performance of steers feeding with increasing levels of Urea Extruded in the diet of finished steers in feedlot.

Urea Extruded (g/100 kg PV)					CV	P
	50	60	70	80		
Initial PV (kg)	334.62	333.50	332.75	333.25	10.56	0.9998
Final PV (kg)	466.75 a	464.42 a	458.14 a	426.13 b	10.06	0.0226
GPT (kg)	132.13 a	130.92 a	129.35 a	100.25 b	16.25	0.0252
GMD (kg/dia)	1.11 a	1.10 a	1.08 a	0.84 b	15.68	0.0279
RC (%)	54.81	52.55	52.00	53.27	4.03	0.1558
SF (mm)	5.23	5.75	5.57	4.52	24.61	0.3935

Means followed by different letters, in the line, differ (P <0.05) by the Tukey test. CV = coefficient of variation.

The carcass yield is of great commercial interest for the refrigerators, since they determine the value of the product purchased and the operational costs, since carcasses with different weights demand the same labor and processing time (Costa et al, 2002). According to Costa et al. (2002), the requirement of the required fat thickness in the carcasses by brazilian slaughterhouses is between 3 and 6 mm. Values over 6 mm are classified with excess fat and end up receiving cuts of the fat cover before the carcass is weighed. According to Lopes et al., (2012) the increase in the thickness of cover fat give carcass implies in reduction of weight loss to the process of cooling the carcass. The results with different levels of extruded urea (50 to 80 g/100 kg PV) showed results ranging from 4.52 to 5.75 mm, within the proposed requirements indicating that it is possible to obtain a satisfactory degree of finish when they are submitted to favorable nutritional conditions, by termination in confinement, thus avoiding that darkening of the external part of the muscles that cover the carcass occurring, depreciating its commercial value.

Conclusions

Extruded urea can be used in the diet of finished bulls in confinement without interfering in productive performance. It is recommended to use extruded urea in up to 70 g/100 kg PV.

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To Pajoara Industria e Comércio Ltda, Campo Grande –MS.

Literature cited

AZEVEDO, H.O.; BARBOSA, F.A.; GRAÇA, D.S.; PAULINO, P.V.R.; SOUZA, R.C.; LAVALL, T.J.P.; BICALHO, F.L. Urea de liberação lenta em substituição ao farelo de soja na terminação de

bovinos confinados. **Pesquisa. Agropecuária. Brasileira**. Brasília, v.50, n.11, p.1079-1086, nov. 2015

COSTA, E.C.; RESTLE, J.; VAZ, F.N. et al. Características da carcaça de novilhos Red Angus superprecoces abatidos com diferentes pesos. **Revista Brasileira de Zootecnia**, v.31, n.1, p.119-128, 2002.

HARRISON, G.A.; MEYER, M.D.; DAWSON, K.A. Effect of Optigen and dietary neutral detergent fiber level on fermentation, digestion, and N flow in rumen-simulating fermenters. **Journal of Dairy Science**, v. 91(Suppl. 1), p. 489, 2008. (Abstr.).

HUNTINGTON, G.B.; ARCHIBEQUE, S.L. Pratical aspects of urea and ammonia metabolism in ruminants. Raleigh: **American Society Animal Science**, 1999. p.1-11.

LOPES, L.S.; LADEIRA, M.M.; MACHADO NETO, O.R.; PAULINO, P.V.R.; CHIZZOTTI, M.L.; RAMOS, E.M.; OLIVEIRA, D.M. Características de carcaça e cortes comerciais de tourinhos Red Norte e Nelore terminados em confinamento. **Revista Brasileira de Zootecnia**, v. 41, n. 4, p. 970-977, 2012.

MAYNARD, L.A.; LOOSLI, B.S.; HINTZ, H.F. et al. **Nutrição animal**. 3.ed. Rio de Janeiro: Freitas Bastos, 1984. 726p.

NATIONAL RESEARCH COUNCIL (NRC). **Nutrient requirements of dairy cattle**. 7th rev. ed. Natl. Acda. Sci., Washington, DC, USA. 2001.