PRODUCTION PROCESS AND APPLICATION OF MOLASSES - UREA CONCENTRATE IN BEEF CATTLE FEEDING

Ljubinko B. Lević, Jovanka D. Lević, Slavica A. Sredanović

The technological process for production of molasses-urea concentrate on the base of molasses, urea, and ammonium phosphate has been developed at the Faculty of Technology in Novi Sad. Molasses-urea concentrate is a liquid feed supplement suitable for adding into the dry part of the diet or any other component during the processing of complete mashess or feeds. In our investigations this liquid supplement was applied onto beet pulp. The final product contained 33.70% crude protein and 1.42% phosphorous that is very similar to the composition of sunflower meal. The experimental results obtained from beef cattle feeding indicated that sunflower meal can be completely replaced by such a combination made from beet pulp and molasses-urea concentrate.

KEY WORDS: molasses-urea concentrate, production process, beef cattle

INTRODUCTION

Nowadays the use of non-protein nitrogen in ruminant feeding has become the wide spread practice due to its economic benefits compared to plant proteins (1,2). It is considered that 1 kg of urea renders the same effect as 6 kg of soybean meal (3). At the same time, the use of urea allows the utilisation of poorer quality forages and feeds with lower protein contents (4).

Urea can be mixed in feed either as a powder or liquid supplement. When urea is added in the form of powder, there is a chance that it will sift through the grain and be unevenly distributed, thus increasing the chance of toxicity. Dissolved urea as the component of liquid supplement can be more homogeneously applied onto the dry part of the diet alleviating the problems of overdosing. Liquid supplement is usually composed of molasses as the source of energy and urea as the substitution for proteins but some other sources of nitrogen and phosphorous as well as some nutritive components can be also included (3).

The utilisation of non-protein nitrogen from liquid supplement has been considered many times and there are a number of literature data on its effective application as nitrogen source in ruminant feeding (4,5).

Dr Ljubinko B. Lević, Prof., dr Jovanka D. Lević, Research Associate, Slavica A. Sredanović, Research Assistant, University of Novi Sad, Faculty of Technology, 21000 Novi Sad, Bulčvar Cara Lazara 1, Yugoslavia.
The aim of our investigations was to develop the production process for liquid supplement which renders stable homogenous product, molasses - urea concentrate, non-settling and non-crystallising and when applied onto beet pulp has beneficial effects in beef cattle feeding as the source of nitrogen, phosphorous and energy.

EXPERIMENTAL

Molasses urea concentrate was produced in sugar refinery in Bač. Monoammonium phosphate and diamoniumphosphate were used along with molasses and urea. The composition of molasses-urea concentrate was conceived so to obtain the quality similar to sunflower meal when added into beet pulp. Molasses-urea concentrate was added into beet pulp in ratios given in Table 1. and after that the mixture was dried in roto-pneumatic dehydrator.

Table 1. The composition of the mixture of beet pulp and molasses-urea concentrate

<table>
<thead>
<tr>
<th>MATERIAL RATIO (%)</th>
<th>BEET PULP</th>
<th>MOLASSES-UREA CONCENTRATE</th>
<th>MIXTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRY MATTER (%)</td>
<td>18.30</td>
<td>6.40</td>
<td>24.70</td>
</tr>
<tr>
<td>CRUDE FIBRE (%)</td>
<td>3.70</td>
<td>-</td>
<td>3.70</td>
</tr>
<tr>
<td>CRUDE PROTEIN (%)</td>
<td>1.90</td>
<td>8.50</td>
<td>10.40</td>
</tr>
<tr>
<td>CA (%)</td>
<td>0.21</td>
<td>0.01</td>
<td>0.22</td>
</tr>
<tr>
<td>P (%)</td>
<td>0.02</td>
<td>0.40</td>
<td>0.42</td>
</tr>
<tr>
<td>UREA EQUIVALENT</td>
<td>-</td>
<td>2.90</td>
<td>2.90</td>
</tr>
</tbody>
</table>

Chemical analyses of raw materials and final products were performed according to AOAC methods (6).

Biological trial with fattening beef was carried out in order to determine the nutritive value of dry product obtained. In basal feed mash, which was fed to group I, 15% of sunflower meal was substituted for 15% of feed obtained by adding molasses-urea concentrate into beet pulp in trial group II. The trial was carried out at the farm in Selen-a and lasted for 105 days. There were two groups of domestic steers with the average initial weight of 310 kg and 25 heads in each group. Weight gain of steers was recorded individually and feed consumption in group. Feed was given ad libitum.

RESULTS AND DISCUSSION

Urea monoammoniumphosphate and diamoniumphosphate, as the sources of urea and phosphorous were chosen for preparation of liquid supplement since they have met the basic criterions for this kind of product:
- easy dissolving, if possible with no rest, in molasses
- no harmful compounds at interreactions
- no significant effects on solution stability
- no significant viscosity increase even at lower temperatures
- chemical aggressiveness of final product as low as possible
- economical price per unit of active substrate (7).
Molasses was used as the carrier of inorganic salts because it is a good solvent and it also contains 45 to 50% sugar, up to 10% protein, 8.5% mineral matters (mostly potassium), vitamin B complex, amino acids (especially glutamic acid) contributing to its high energy and nutritive value (8).

The sequence of dissolving and mixing of the individual components of this liquid supplement as well as keeping of the adequate temperature and pH are very important for avoiding the gas separation and loss of nitrogen, phosphorous and energy during the production process (9).

The developed technological process allowed the production of homogenous molasses-urea concentrate of the adequate viscosity. Settling or crystallisation were not observed during keeping.

After drying feed obtained by applying this urea concentrate onto beet pulp contained 11.5% moisture, 33.7% crude protein, 14.8% crude fibre, 0.76% Ca and 1.42% P, that is very similar to sunflower meal composition according to AEC tables (10).

The results of the biological trial shown in Table 2 have indicated that feed obtained by applying molasses-urea concentrate onto beet pulp was adequate substitution for sunflower meal in beef fattening. The results were good and very similar in both trial groups. There were no statistically significant difference (P > 0.01) for daily weight gain or daily feed consumption between the groups.

Table 2. The results of beef fattening

<table>
<thead>
<tr>
<th>PERFORMANCES OF BEEF CATTLE</th>
<th>GROUP I</th>
<th>GROUP II</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVERAGE INITIAL WEIGHT [KG]</td>
<td>310.2</td>
<td>309.7</td>
</tr>
<tr>
<td>AVERAGE FINAL WEIGHT [KG]</td>
<td>448.1</td>
<td>451.7</td>
</tr>
<tr>
<td>DAILY WEIGHT GAIN [G]</td>
<td>1313</td>
<td>1352</td>
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<tr>
<td>INDEX</td>
<td>100</td>
<td>103</td>
</tr>
<tr>
<td>DAILY FEED CONSUMPTION [KG]</td>
<td>9.1</td>
<td>8.9</td>
</tr>
<tr>
<td>INDEX</td>
<td>100</td>
<td>98.1</td>
</tr>
<tr>
<td>FEED CONVERSION [KG]</td>
<td>7.1</td>
<td>6.8</td>
</tr>
<tr>
<td>INDEX</td>
<td>100</td>
<td>96.7</td>
</tr>
</tbody>
</table>

CONCLUSION

The developed technological process allowed the production of homogenous molasses-urea concentrate from molasses as the carrier and solvent and urea, mono-ammoniumphosphate and diamoniumphosphate as the sources of nitrogen and phosphorous. The product has adequate viscosity, it is non-settling and non-crystallising.

Feed obtained by applying molasses-urea concentrate onto beet pulp, after drying, contained 11.5% moisture, 33.7% crude protein, 14.8% crude fibre, 0.76% Ca and 1.42% P, very similar to sunflower meal composition.

This product was successfully used as the substitution for sunflower meal in beef fattening.

REFERENCES


**ПРОИЗВОДЊА И ПРИМЕНА МЕЛАСНО-УРЕЈСКИХ КОНЦЕНТРАТА ЗА ИСХРАНУ ЈУНАДИ**

Љубишић Б. Левић, Јованка Д. Левић, Славица А. Средановић

Циљ наших истраживања је био да поставимо технолошки процес производње течних крмних предсмеша на бази меласе, урее, моноамонијумфосфата и диамонијумфосфата којим ћемо добити стабилан и хомоген производ, меласно-урејски концентрат.

Дефинисаним технолошким поступком произведен је меласно урејски концентрат утврђеног састава и одговарајућих физичко-хемијских карактеристика. Мешањем меласно урејског концентрата са изложеним резанцима шећерне репе добијено је храниво које је након сушења садржало 11,5% влаге, 33,7% сирових протеина, 14,8% сирове целулозе, 0,76% Ca и 1,42% P, што је приближно саставу сунцокретове сачме. У оброцима товне јунади, 15% овог хранива успешно је заменило 15% сунцокретове сачме. Постигнут је дневни прираст од 1352 г уз дневну конзумацију хране од 8,9 кг.

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