EFFECT OF RAW MATERIAL FOR DISTILLERS GRAINS PRODUCTION ON PROTEIN QUALITY FOR RUMINANTS

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INTRODUCTION

The milling process for bio-ethanol production is relatively simple. Alcohol can be produced from cereal grains rich in starch. The type of grain is the primary factor that influences the nutrients content of distiller's grains (DG). The remaining nutrients in DG are 3-4-times more concentrated than in original material. The main attention regarding the use of DG as dairy cows feedstuff must be focused on quality of CP, mainly content of CP, amino acid composition, ruminal undegraded CP and amino acids intestinal digestibility. The objective of this study was to determine some nutritional characteristics of DDGS from wheat, corn and triticale (dry and wet).

MATERIAL AND METHODS

For our experiment were used: DDGS from corn (DDGSc**,** n=8), from wheat (DDGSw, n=6), from triticale (DDGSt, n=3) and WDG from corn (WDGc, n=7). Samples were analysed for DM, CP, AA, NDF, ADF, N-NDF, and N-ADF, resp. For CP degradability assessment was used standardised in sacco method and for intestinal digestibility the mobile bag technique on three cows with a rumen cannula and a T-cannula in the duodenum. The intestinal digestibility of CP and AA we used ruminal undegraded residues after 16 h incubation of feeds. For ruminal degradability and intestinal digestibility we used n=3 for DDGSc, n=5 for DDGSw and n=3 for DDGSt.
The results for DDGS were evaluated by One-way analysis of variance and significant differences were declared at $P<0.01$ and $P<0.05$. The results for DDGSc and WDGc were evaluated by T-test and Homogenity of Variance.

RESULTS

Among tested DDGS were found significant differences in CP, N-NDF and N-ADF content (Table 1). Between DDGSc and WDGc was only NDF content significantly different ($P<0.01$).

- The variability in the content of NDF and ADF within the tested DDGS of different origin was 11.3 % and 25.2 %, resp. The highest variability was for DDGSw (31.9 %).
- In DDGSw and DDGSt were determined 2-times higher N-ADF content than in DDGSc and differences were significant ($P<0.01$ and $P<0.05$). The variability for N-ADF in DDGSw was the highest (42.3 %).
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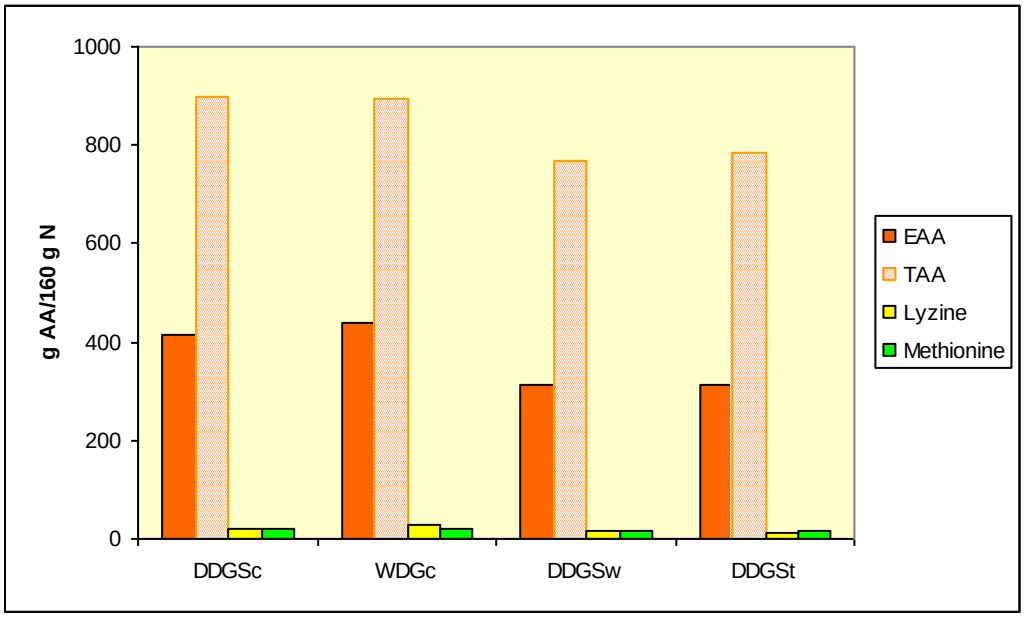
Table 1 Chemical composition of DDGS from corn, wheat and triticale and WDG from corn

	Nutrients content g/kg DM					% of total N	
	CP	NDF	ADF	N-NDF	N-ADF	N-NDF	N-ADF
DDGSc	289.9[a.b]	383.4[c]	179.8	8.59	6.33	18.4	13.7
DDGSw	356.9[a]	367.7	223.7	14.99	12.14	26.3	21.2
DDGSt	329.0[b]	378.6	261.3	14.91	13.73	28.3	26.1
WDGc	302.0	542.4[c]	209.7	5.89	4.19	11.7	18.5

[a,b,c] within a column, means with the same superscript differ (P<0.01 and P<0.05)

- Among content of total AA content per 160 g N in DDGS were differences (Fig. 1). The highest was difference between DDGSc and DDGSw for total AA (ca 133 g) and between DDGS and DDGSw and DDGSt (ca 100 g). The Lysine and Methionine concentration were the highest in WDGc (29.3 resp. 20.5 gper 160g N)



- Crude protein effective degradability of individual samples of DDGS were in wide rage and the share of undegraded CP (by –pass CP) also (Table 2)

Table 2 Crude protein effective degradability and by-pass crude protein

	Effective CP degradability (%)	By-pass CP (%)
DDGSc	47.7 – 53.4	38.6 – 49.9
DDGSw	48.6 – 68.1	62.7 – 29.7
DDGSt	59.6 – 61.7	33.8 – 31.4
WDGc	46.5 – 47.0	51.9 - 55.6

- In intestinal CP degradability (Fig. 2) were differences among individual samples of DDGSw, they are in the range from 79.7% to 91.6 %. More stable

and with the high ID values were DDGSc (>94 %). The sample of DDGSt and DDGSw with high levels of N-ADF have the lowest ID of CP

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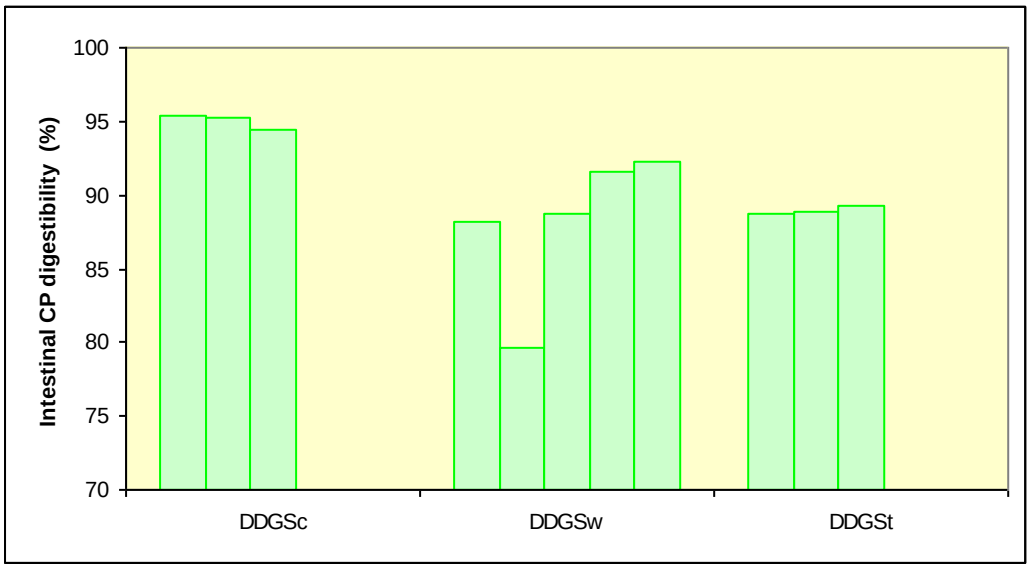

Fig. 2 Intestinal digestibility of ruminal undegraded CP of individual samples of DDGS

- Intestinal digestibility of nonessential and essential amino acids especially Lysine and Methionine are in the Fig. 3. Between ID of EAA and NEAA are very small differences – ID of NEAA has tendency be lower.
- ID of Lysine is the lowest from all of AA in all DDGS samples. Intestinal digestibility of Lysine is higher in DDGSc than in DDGSw and DDGSt
- ID of Methionine is the highest in DDGSc (96.1 - 97.2 %) and variability among individual samples was very low. ID of Methionine in DDGSw varied from 81.4 % to 94.6 %. The values for DDGS are very similar (see Fig.3)

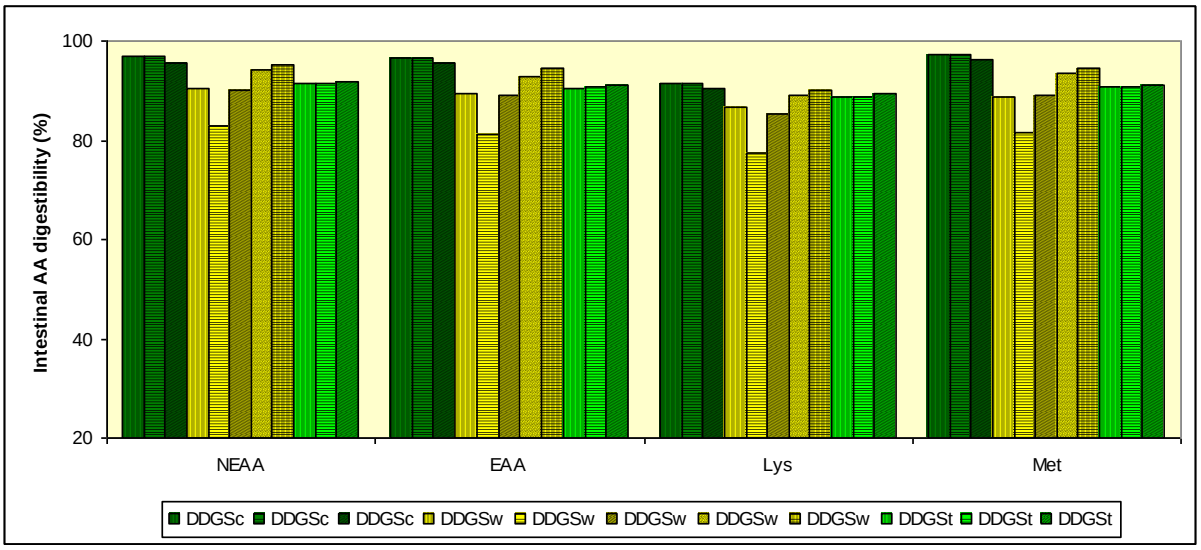

Fig. 3 Intestinal digestibility of amino acids in ruminal undegraded residues of individual samples of DDGS

Conclusion

DDGS from cereal grains are a good source of protein for ruminants. Quality of crude protein is much better than in raw material because CP degradbility is lower and intestinal digestibility of by-pass CP is high, mainly in DDGSc (>94 %). Similar, the ID of EAA (>90 %) are very high except the value in one sample of DDGSw (81.3 %).

ACKNOWLEDGEMENT

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