STUDY ON THE POSSIBILITY OF IMPROVING OF NUTRITIVE VALUE OF WHEAT STRAW BY BAKER'S YEAST (*SACCHAROMYCES CEREVISIAE* 1026)

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ABSTRACT

In order to study the possibility of enrichment of wheat straw through inoculation by backer's yeast (*Saccharomyces cerevisiae* 1026), with or without additives, a completely randomized design experiment, using of factorial method, including 4×3×3 treatments with 3 replicates was conducted. The major factor was *S. cerevisiae* at four levels including 0.0, 0.5, 1.0 and 1.5 percent, second factor was molasses at three levels including 5 , 10 and 15 percent and the third factor was a mixture of corn-barley flour at three levels of 0.0, 5 and 10 percent at wheat straw (dry matter basis). For each experimental unit, 300 g of chapped wheat straw was mixed with 300 ml. of 30-35^0**C** contained the relative amount at yeast and additives and packed in black plastic bags when the bags were left down at 25-27^0**C** room temperature for 7-10 days. Thereafter, the samples were removed from the bags and used for chemical analysis. Results indicated that no any significantly differences were observed for the dry matter, crude protein, ether extract, crude fiber, Ash, neutral detergent fiber and acid detergent fiber among the treatments. It can be concluded that inoculation of wheat straw with or without additives could not have any positive effect on its nutritive value.
Key words: yeast, *Saccharomyces cerevisiae*, wheat straw, Nutritive value.

1. INTRODUCTION

Rough forages that is often used to feed animals ranging from reach straw, straw, baggasse and other agricultural residues and most of them usually have a low digestibility of the cell wall is composed. Cell wall was made of cellulose, hemicellulose, lignin and minerals. In addition, the lignin is not digestible, which prevents the digestion of other components as cellulose and hemicellulose. Carbon-carbon and ether bonds of lignin is not easily broken with simple hydrolysis and this problem causes to the difficult degradation of its building. Therefore, the restriction is necessary to be reduced in different ways (Hadizadeh et al, 1998). Delignification of rough forages particularly straw were compared with chemical and biological methods by Hans et al (1992) and it was shown that chemical methods are mainly caused to loss of lignin, in biological methods not only is happened degradation of lignin but also increased the quality and nutrient value of product.

Russian researchers have described a method in which the animals diets with enriched straw (with enzymes and yeast culture), grain wastes, molasses, minerals and urea (2/0%) were prepared and processed, so they recommended that enrichment of straw with enzymes and yeast can improve the nutritional value and using of this ration in

pelleted form or simple in lactating dairy cows fed increased two kilogram in daily milk production (Yudin et al, 1982).

Live yeasts have maximum growth at 4.5 pH in the rumen and growth decline finds in 6.2 pH that in this time the synthesis of amino acids, nucleotides, vitamins and enzymes like nucleases, proteases, gluconases, mannoses, lipases and amylases were stimulated by yeasts and the enzymes are more active when the live yeasts growth is low. Chemical products have an important role in digestion and absorption of nutrients (Javanmard,2000; Mehdizade et al, 1995; Wohlt et al,1998). Doguda et al (1994) reported that yeasts can adsorb the aflatoxin of diet by mannan of oligosaccharides in the cell walls and neutralize it and in this way have an important influence on growth. By regarding at available resources and research reports was shown the effect of yeasts on the digestion and absorption of rough forages, especially straw that mainly, the backer's yeast stimulate growth and increase the number of rumen bacteria and protozoa indirectly and by creating a suitable substrate, production of metabolites and enzymes that needed for them. Consequently, the lignification, cellulose and NDF digestibility and the digestion and adsorption of rough forages were improved and increased(Siunit, 1989; New bold et al, 1995 and 1996).

2. MATERIALS AND METHODS

2.1. Backer's Yeast (Saccharomyces cerevisiae 1026):

DM 90.8%, OM 93.2%, crude protein 51.5%, ether extract (EE) 6.3%, crude fiber 1.8%, ash 6.8% per kg of dry matter of yeast and colony forming unit of yeast cells (cfu) is equal to 7×9 10 per gram.

2.2. Wheat straw - DM 94.64%, CP 2.87%, ether extract (EE) 0.7%, crude fiber 42.23%, ash 9.54% and the net energy 3712.78 kcal per kg dry matter.

2.3. Experimental design: According to the multi factorial nature of the experiment, this research was performed by a completely randomized design experiment, using of factorial method, including 4×3×3 treatments with 3 replicates was conducted. The major factor was *S. cerevisiae* 1026 at four levels including **0.0, 0.5, 1.0** and **1.5** percent, second factor was molasses at three levels including **5, 10** and **15** percent and the third factor was a mixture of corn-barley flour at three levels of **0.0, 5** and **10** percent at wheat straw (dry matter basis). In conclusion, the experimental data obtained from chemical analysis of samples was statistical analyzed by **SPSS** statistical software and Duncan's test was performed to compare of means.

2.4. Preparation of samples: In first time. wheat straw was chapped into 3-2 cm pieces and were used the required number of samples in 300g weight. The certain amounts of *S. cerevisiae* was weighted for each experimental unit and each in 100 ml of cooled boiled water 30-35ºC were resolved. The sugar beet molasses ratios for each experimental unit was dissolved in a 200 ml boiling water and after cooling was added into the containing yeast solution. Then, di-ammonium phosphate in half a percent of dry weight of wheat straw was added to the solution with them in straw. Samples were placed in black plastic bags and then press out the air inside the bag, the bag was tightly closed, and then paste the label on the sample profile, so were put in laboratory temperature 25-27ºC for 7 to 10 days. After this period, the samples appearance was investigated and measured pH levels, so the samples were dried in 60ºC temperature by electric oven for 48 hours. After drying and milling, were taken the samples from each

experimental unit to chemical analysis in nutrition laboratory of animal sciences research institute, Karaj-Iran.

3. RESULTS AND DISCUSSION

Data obtained from chemical analysis of wheat straw samples were processed separately for each experimental factors: baker's yeast (*S. cerevisiae*), sugar beet molasses were statistically analyzed with ANOVA and In each means comparison was performed by the Duncan's test.

The results showed that crude protein of wheat straw in the control group and experimental groups (treated straw with 0.5, 1 and 1.5% of yeast) were 4.98± 0.13, 5.11± 0.16, 5.14±0.1 and 5.40±0.18% in dry matter, respectively. There was no significant difference between the means (**P<0.05**) (Table 1).

According to researchers, such as Hadizadeh (1998), Boda (1990) and Leng (1991) the crude protein of treated straw by fungi was more than untreated straw and increasing in true protein with high quality and remaining of some vitamins in treated rough forages was the reason of degradation increasing of structural polysaccharides and microbial efficiency too. The crude protein with or without treated by yeast were increased than before treating (2.87% CP) and that may be caused by ensiling with molasses.

Table 1 - Mean and standard error of the chemical composition of wheat straw indifferent treatments with yeast

% Yeast	Dry Matter %					Kcal/kg
	DM	CP	CF	NDF	ADF	NE **
0	95.54±0.09	4.98± 0.13	35.62 ± 0.60[a]	66.29 ± 0. 88	37.71 ± 0.61	3849.4 ± 29.63[a]
0.5	95.49 ± 0.08	5.11 ± 0.16	36.42 ± 0.19[b]	65.89 ± 0.64	39 ± 0.47	3717.4 ± 28.88[b]
1	95.42 ± 0.08	5.14 ± 0.10	37.64 ± 0.49[b]	66.27 ± 0.58	37.82 ± 0.47	3716.3 ± 27.24[b]
1.5	95.19 ± 0.16	5.14 ± 0.18	36.31 ± 0.29[b]	67.16 ± 0.47	39.58 ± 0.97	3728.3 ± 25.20[b]

* The mean difference in column (crude fiber and Ether exract) with different letters (a and b) is statistically significant (P<0.05)

.** The mean difference in net energy column with different letters (a and b) is statistically significant(P<0.01).

The crude fiber of wheat straw in the control group and experimental groups respectively was, 35.62±0,6, 36.42±0.19, 37.64±0.49 and 36.31±0.29% in dry matter. There was significant difference between the means (**P<0.05**) (Table 1).

The NDF of wheat straw in the control group and experimental groups respectively was, 66.29±0.88, 65.89±0.64, 66.27±0.58 and 67.16±0.47% in dry matter and the ADF respectively was, 37.71±0.61, 39±0.47, 37.82±0.47 and 39.58±0.97% in dry matter. There was no significant difference between the means (Table 1).

Total energy of wheat straw in the experimental groups and control groups, respectively, 3849.4±29.63, 3717.4±28.88, 3716.3±27.24 and 3728.3±25.2 Kcal per kg dry matter There was significant difference between the means (**P<0.05**) (Table 1). In treated wheat straw without yeast has increased than other experimental groups and there was significant differences (**P<0.01**).

According to the results obtained in this study were identified baker's yeast in outside of the rumen environment and in vitro conditions has no ability to utilize of cell wall and its lignin and can not improve the nutrient value of wheat straw.

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