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Spent Brewer's yeast as a Protein supplement

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Abstract

Spent brewer's yeast is not commonly used as a feed supplement. In the present study the chemical and mineral composition is analyzed as per standard procedures. Spent brewer's yeast was found to contain 92.77, 39.49, 0.16, 0.51, 6.35, 53.49 and 0.54 per cent DM, CP, CF, EE, total ash, NFE and acid insoluble ash, respectively in the present study. Spent brewer's yeast was found to contain 0.11, 1.54 and 0.09 per cent of Ca, P and Mg and 8.10, 0.93, 65.73 and 64.58 ppm of Mn, Cu, Fe and Zn, respectively. Live yeast is extensively used as a supplement in feed industry, like wise spent yeast can also be used as a protein supplement.

Keywords: Spent brewer's yeast, Immuno stimulant, supplement

Introduction

Yeast contains various immuno stimulatory compounds such as beta glucans and mannan oligosaccharides which serve as an excellent health promoter. Spent brewer's yeast, the second major by-product from brewing industry, is the yeast which remains after the brewing process. It is a fermented product containing inactive yeast cells and metabolites formed during fermentation. Disposal of this major byproduct is a problem for the breweries. Spent brewer's yeast is an excellent source of protein, non starch polysaccharides, B-complex vitamins, minerals and several other unidentified growth factors.

Though live yeast is widely used as probiotic and toxin binder in animal feed industry, spent yeast has received little attention as a marketable commodity. No systematic study could be reviewed on the efficacy of utilization of spent brewer's yeast, either as a protein supplement or feed additive in the rations of livestock and poultry.

Materials and Methods

Spent brewer's yeast samples were analyzed for the proximate and mineral composition as per standard procedures (1).The viability of spent brewer's yeast was assessed by using the dilution plate technique with Sabouraud agar medium incorporating chloramphenicol to prevent bacterial contamination. The sample was found to contain dead yeast cells only. The samples were analyzed for various major and trace minerals (1). Minerals such as Ca, Mg, Mn, Fe, Cu and Zn contents were analyzed using atomic absorption spectrophotometer (Perkin Elmer 3110) after wet digestion, using nitric acid and perchloric acid (2:1). P content of both feed and faecal samples were analyzed by colorimetry (Vanado-Molybdate method), using spectrophotometer (spectronic 1001 plus, Milton Roy, USA).

Results and Discussion

Spent brewer's yeast was found to contain 92.77, 39.49, 0.16, 0.51, 6.35, 53.49 and 0.54 per cent DM, CP, CF, EE, total ash, NFE and acid insoluble ash, respectively in the present study. Brewer's dehydrated yeast was reported to have a DM and CP content of 93.00 and 45.90 percent respectively (NRC, 1998). On reviewing literatures on the chemical composition of brewer's yeast, different authors have reported varying values on nutrient composition. Arambel and Kent (1990) from their study on effect of yeast culture on nutrient digestibility and milk yield in dairy cows during early to mid lactation period, reported a crude protein (CP) content of 14.00 per cent and crude fibre (CF) level of 0.80 per cent. Korengay *et al*. (1995) reported comparatively lower CP value of 12.00 per cent and higher CF value of 6.50 per cent for yeast culture. Dried brewer's yeast was reported to contain 43.00 per cent CP, 1.50 per cent crude fat, 5.50 per cent ash and 3.13 Mcal ME/kg by White *et al.* (2002) and LeMieux *et al*. (2010). From the study on incorporation of baker's yeast as growth promoters in pigs, Sekar (2003) reported that baker's yeast was found to contain 96.25, 31.20, 5.20, 1.45, 7.10 and 55.05 per cent dry matter (DM), CP, ether extract (EE), CF, total ash and nitrogen free extract (NFE), respectively.

Spent brewer's yeast was found to contain 0.11, 1.54 and 0.09 per cent of Ca, P and Mg and 8.10, 0.93, 65.73 and 64.58 ppm of Mn, Cu, Fe and Zn, respectively. As per NRC (1998) dried brewer's yeast had 0.16, 1.44 and 0.23 per cent of Ca, P and Mg and 8, 33, 215 and 49 ppm of Mn, Cu, Fe and Zn respectively. LeMieux *et al.* (2010) obtained comparable values of 0.12, 1.13 and 0.20 percent of Ca, P and Mg respectively for dried brewer's yeast. Arambel and Kent (1990) reported 0.30, 0.70, 0.10, 0.20 and 0.70 percent Ca, P, Mg, S and K respectively for yeast culture. Mineral composition of baker's yeast was found to be 0.78, 0.32 and 0.13 per cent of Ca, P and Mg and 232.00, 142.72, 35.68, 27.06 and 2.90 mg/kg of Fe, Zn, Mn, Co and Cu respectively (Sekar, 2003).

About 50 to 60 per cent total yeast cell wall polysaccharide is constituted by β-D glucan, which can enhance the functional status of macrophages and neutrophils and increase resistance to infections. Smits *et al*. (1999) reported that 30 to 40 per cent of the yeast cell wall is composed of mannans and mannoproteins. White *et al*. (2002) from his studies on feeding of brewer's yeast in pigs, as a source of mannan oligosaccharide (MOS) reported MOS content of 5.2 per cent in dry brewer's yeast. Yeast β-D glucan and α-D mannan can adsorb various mycotoxins and therefore its admixture to the animal feed may lead to suppression of the toxic effect of these substances.

White *et al.* (2002)from their studies on feeding of brewer's yeast in pigs reported that dried yeast contains 5.2 per cent of MOS. They observed a positive effect on intestinal health with reduced total coliform counts and increased IgG and IgA levels in pigs fed brewer's yeast alone (3 per cent) or in combinations with citric acid (2 per cent).According to DiGiancamillo *et al*. (2003) yeast stimulated non specific host resistance to microbial antigens, enhanced the production of macrophages and thereby, improved immune response. Stella *et al.* (2007) on feeding live yeast (*S. cerevisiae*) in goats could also observe significant reduction of faecal *Escherichia coli* and increase in Lactobacilli in the yeast fed animals.

Jensen *et al*. (2008) from their studies on anti inflammatory effects of yeast culture reported that aqueous extract of yeast culture contained anti-oxidants that can enter living cells and quench free radicals. Immunostimulant property of yeast as indicated by increased percentage of lymphocytes, especially CD_4 and CD_8 subpopulation of T cells was reported by Speranda *et al.* (2008) and Van-der-Peet-Schwering *et al*. (2009) on supplementing with progut, a hydrolysed brewery yeast product and yeast cell culture and cell wall products, respectively in weanling piglets.

Santin *et al*. (2003) noticed improved immune response of broilers challenged with strain of velogenic Newcastle disease virus in yeast fed birds. On feeding yeast at the rate of 1g/kg diet Sosan *et al.* (2010) observed an improved immune response and decreased mortality rate in broilers. Yeast supplementation was found effective in decreasing the morbidity and total sick days in feed lot calves and lambs (Cole *et al*., 1992 and Zinn *et al*., 1999). Schingoethe *et al*. (2004) reported improvement in FE in heat stressed dairy cows on yeast supplementation.

Conclusion

Thus it could be inferred that spent brewer's yeast can be effectively utilized as a protein supplement.

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