ISSN 1682-8356
ansinet.org/ijps

INTERNATIONAL JOURNAL OF

POULTRY SCIENCE

ANSInet
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorijps@gmail.com

International Journal of Poultry Science 4 (10): 787-789, 2005
ISSN 1682-8356

Distillery Yeast Sludge (DYS) as an Alternative Feed Resource in Poultry

K. Sudha Rameshwari[1] and S. Karthikeyan[2]
[1]Faculty of PG Biochemistry, V. V. Vanniaperumal College for Women,
Virudhunagar-626 001, Tamilnadu, India
[2]Department of Microbiology, Agricultural College and Research Institute, Madurai, Tamilnadu, India

Abstract: With India's livestock population approaching 100 million, the demand for dry fodder and concentrates is more than twice the supply and the demand for green fodder is four times the supply mean while 242 MT sugarcane is produced annually with lot of yeast sludge awaiting disposal. Hence, the present investigation was aimed at determining the nutritive content of distillery yeast sludge (DYS) and its use as a value added feed additive. It was fed to white leghorn chicks of one week of age for a period of 45 days at different levels of incorporation (0%, 10%, 30%, 50%, 70%). One bird of each treatment died except in the control and the 10% level. The marginal decline in weight gain was observed with increasing levels of DYS in the diet. At the end of 45th day of experiment, blood was collected from the surviving birds and biochemically analyzes the Hemoglobin, serum protein, calcium and phosphorus The cost of feed per 100g live weight gain decreased with the inclusion of DYS in the diet than in the control feed. The results thus indicate that DYS, after washing, can safely be included for growing chick, up to 30% level with distinct economic advantages.

Key words: Distillery yeast sludge (DYS), feed additive, poultry

Introduction

A major problem facing the world, in particular the developing country is the population growth. India is the second most populous country of the world with a population of over 103 crores. The increase in population is creating an alarming situation in the food scenario in India. Decreasing supply from conventional agriculture has forced mankind to search for alternate sources of food and feed. Now-a-days microbes act as protein producers. Microbes are used as source of food either directly or as a feed through use in pisciculture and poultry farming. Of all the microbes, yeast has been commercially exploited most, for the production of alcohol, vitamins and more recently single cell production (Nickerson and Brawn, 1965). Yeast was very rich nutritive value of protein and has no toxic substance like other microorganisms like bacteria. Yeast has been used as fodder successfully for certain animals such as horses, cows, and as feed for poultry (Rosales, 1984). Molasses is mainly fermented by *Sacchromyces*. So the waste materials from the sugar industry can be used as the substrate for the production of feed for poultry with the help of yeast, mainly *S.cerevisiae* (Jnanendra and Bhattacharjee, 1970). Yeast sludge, a byproduct of molasses based industries, with an availability of one million ton per annum (Verma and Shyam Sundar, 1988), is a potential feed for poultry. Hence, the present investigation was carried out to determine the nutritive content of distillery yeast sludge and its use as a value added feed additive.

Materials and Methods

Distillery yeast sludge [DYS] was collected from Dharani Sugars and Chemicals, Vasudevanallur, Tamilnadu, India and transported to the laboratory immediately and stored at 4^{0}C for further analysis. Rajakala and Sudha Rameshwari deviced a new method for the removal of bad smell from the DYS. DYS is washed with water and centrifuged and the supernatant is discarded. Then sodium chloride (0.5N) solution is added to the pellet, mixed well and centrifuged. The pellet is washed with water and centrifuged. The supernatant can be used for compost preparation. To the pellet phosphoric acid with 0.5M sodium chloride is added (to impart slight acidity to the feed) and centrifuged. The pellet is air dried, powdered and used as feed. Phenol, crude fiber, ash content, protein, methionine, lysine, tryptophan, calcium, iron, phosphorus, mannan, glucan, glycogen, thiamine, ascorbicacid were estimated. The aminoacid present in the yeast sludge were identified by paper chromatography. For feeding trials, thirteen healthy white leghorn chicks of one week's age were selected and they were distributed in five groups with three chicks in each treatment. The chicks were kept in separated sterilized cages properly fitted with air supply. The four test groups of chicks were fed with dried yeast sludge in different percentages (10%, 30%, 50%, 70%) and the control group chicks were fed with company feed for 45 days. At the end of 45th day blood was collected from the surviving birds for haematological study and for the estimation of protein (Lowry *et al.*, 1951), calcium (Endres *et al.*, 1999), Phosphorous (Amador and Urban, 1977) and Hemoglobin by Cyanohaemoglobin method.

Table 1: Average values of body weight gain, Feed consumption, Feed conversion ratio and feed cost

	% Level of yeast sludge				
	0	10	30	50	70
Initially number of birds	3	3	3	3	3
Finally number of birds	3	3	2	2	2
Initial weight (gram)	47.3	45.0	40.0	40.0	43.0
Final weight (gram)	315.0	272.5	166.0	166.0	126.7
Total weight gain in 45 days	267.8	227.5	126.3	126.3	106.3
Feed consumption in 45 days (gram)	741.5	761.0	390.0	390.0	373.0
Feed / gain ratio	2.8	3.4	3.1	3.1	3.5
Cost /100 gram body weight gain (RS)	4.15	4.56	2.4	2.4	1.62

Table 2: Chemical / biochemical parameters in Serum

Parameters	0% DYS	10% DYS	30% DYS	50% DYS	70% DYS
Serum protein (g/dl)	3.3	3.4	3.4	3.5	3.6
Calcium (mg/dl)	9.2	10.1	15.2	16.2	17.0
Phosphorus (mg/dl)	5.0	5.8	5.6	5.9	6.2
Haemoglobin (g/dl)	7.2	7.0	6.5	5.5	4.2

Results and Discussion

Distillers produce yeast sludge as solid waste to a tonne of million tones actually, requiring disposal. Yeast sludge is rarely utilized in India, but it is rich in vitamins and proteins. The shortage and high cost of traditional energy feed for livestock and poultry have initiated studies on the nutritive value of dried yeast sludge and also planned to assess the feeding value of dried yeast sludge at higher levels of inclusion in chicks of white leghorn.

Composition of dried yeast sludge is Protein - 21%; Methionine - 4%; Tryptophan - 2.4%; Lysine – 10%; Calcium – 3%; Iron – 0.35%; Phosphorus – 0.23%; Phenol – 0.23%; Crude fiber – 5.5%; Moisture –5%; Ash content – 56%; Glucan – 3.6%; Mannan – 2.8%; Glycogen – 1.2%; Thiamine – 0.06%; Ascorbic acid – 3.0%;

The results show that the yeast sludge contains a high amount of protein (21%) and is also rich in essential amino acids such as methionine, lysine and tryptophan, which are essential for the growth and health of the animals compared to cereals. Cereals contain only 12% to 15% protein and are deficient in essential amino acids. The chicks, for growing, laying and breeding required 15% to 20% of protein.

Feeding requirements may be varied depending upon the animal. For example, poultry broiler chicks required more protein than the layers i.e. white leghorn chicks.

Glucan and mannan act as feed additives and they prevent protein loss during any condition of protein denaturation. Protein in yeast sludge always exists in the form of glycopeptides.

In cereals like sorghum the fiber content is 2%. But yeast sludge contains 5.5% fiber content. It adversely affects the digestion and absorption of protein. The endogenous excretion of nitrogen was found to be high in diets rich in fiber. The digestibility of protein decreases and there is great loss of nitrogen in faeces, when fiber in the diet increases (Swaminathan, 1990). This result coincides with the findings of Singh and Sachan (1972). Phenol content was more in yeast sludge. The phosphorous and iron required for chicks was 0.6 to 1.0% but our prepared feed contained only 0.23% and 0.35% respectively. Iron content, which is essential for haemoglobin formation, was very low in yeast sludge compared to cereals. So, when feeding, supplements like amaranths and sorghum were added to the yeast sludge to meet the need for phosphorus and iron. The calcium content in yeast sludge was three fold higher than the requirement, which might lead to disorders like stone formation or Constipation. The presence of excess calcium in the diet adversely affects the intestinal absorption of phosphorous and the converse is also true. Hence the yeast sludge may be fortified with other adjuncts. Thiamine content was essential for the growth of the chicks. Ascorbic acid was rich (3%) in yeast sludge than other feeds. It was essential for the formation of intercellular cement substances in the capillaries, bones etc., and it also helps in the absorption of iron.

Table 1 shows that in all the treatments one bird died except 0% and 10% due to starvation, which had taken small amounts of feed because of the bad smell and high content of phenol. After the removal of smell from the feed then all the birds were fed normally and gain weight.

All the chicks, irrespective of the treatment, reached a body weight of 127 to 315gram within the same period. The maximum body weight was obtained by the group fed with control followed by the groups receiving 10%,

30%, 50%, 70% yeast sludge in that order. However a marginal decline in weight gain was observed with increasing levels of yeast sludge in the diet. Gonalez *et al*. (1980), recorded similar weight gains. Increased weight gain in the control group was due to high protein content (52%) than yeast sludge, which contains 21% protein.

The feed consumption was the highest in the group fed with 10% yeast sludge and the lowest in 70% yeast sludge group compared to the control. Manfredini and Cavani (1980) made similar observations. Feed conversion ratios in the control and the 30% group were the 2.8 and they were superior to those of the 10%, 50% and 70% levels of yeast sludge in the diet groups. The cost of feed decreased per 100gm weight gain with the inclusion of yeast sludge in the diet than in the control feed.

The amino acids in the DYS are lysine, methionine, glycine, arginine, leucine and histidine were identified by Paper chromatography.

Table 2 shows that hemoglobin content varied from 4.2 to 7.2g/dl. The normal level of Hemoglobin content (7-12/dl) was found in 0% and 10% level of DYS fed birds. There was marginal decline in hemoglobin with increasing levels of DYS fed birds. There were no significant changes in the values of serum protein (3.3 to 3.5g/dl). Calcium content was varied from 9.2 to 15.2mg/dl. Phosphorus content (5-6.2 mg/dl) was with in the normal range and there was not significantly differ from one another. Our results coincides with Senthil Kumar *et al*. (1997)

The present results suggest DYS, after washing, can safely be included for growing chicks, up to 50% level without any deleterious effect with distinct economic advantages.

References

Amador, E. and J. Urban, 1977. Simplified serum Phosphorus analysis by continuous flow UV spectrometry. Clin. Chem., 18: 60.

Endres, D.B., R.K. Rude, 1999. Mineral and bone metabolism. In:Burtis CA, Ashwood ER, editors. Tietz Text book of clinical chemistry 3rd ed. Philadelphia. :W.B. Saunders Company, p: 1395-1457.

Gonalez, F.B., P.F. Rentel and M. Soldevita, 1980. Dried rum distillery stillage in broiler rations. J. Agri. Univ. Puerto Rico, 60: 194-204.

Jnanendra and Bhattacharjee, 1970. Microorganisms as potential sources of food. Adv. Appl. Microbiol., 13: 139.

Lowry, O.H., N.J. Roseburgh, A.L. Farr and R.J. Randall, 1951. Protein measuremnt with Folin Phenol reagent. J. Biol. Chem., 193: 265-275.

Manfredini, M. and C. Cavani, 1980. Distillery effluents as animal feed. The use of condensed beet molasses stillage (CBMS) in broiler feeding. Anim. Feed. Sci. Tech., 5: 233-239.

Nickerson, W.J. and R.G. Brawn, 1965. Uses and products of yeasts and yeast like fungi. Adv. Appl. Microbiol., 7: 225.

Rosales, F.H., 1984. Yeast as protein source for human nutrition. Acta Microbiological Hungarica, 31: 159.

Singh, R.P. and Sachan, 1972. The influence of yeast sludge on the growth of white leghorn chicks. Ind. Vet. J. 49: 704-709.

Senthil Kumar, M. R. Kadirvel and R. Vijaya Kumar, 1997. The use of dried yeast sludge in broiler rations. Ind. J. Poult. Sci., 32: 137-141.

Swaminathan, M., 1990. Principles of Nutrition and Dietetics. In: Nutritional aspects of carbohydrates, pp: 86.

Verma, S.V.S. and G. Shyam Sunder, 1988. Nutritive value of inactive dry yeast for broiler chicks. Ind. J. Anim. Nutr., 5: 137-143.