CHEMICAL COMPOSITION OF HATCHERY WASTE

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ABSTRACT

Hatchery waste (HW) was obtained from egg type and broiler type chicks hatcheries comprising of infertile, cracked eggs during incubation, dead-in-shells, empty shells and male chicks, from egg type hatches. The crude protein and calcium (Ca) in HW were 35.49 and 20.60%, respectively. The HW was mixed with soybean cake in the ratio of 40:60 before extrusion and extruded hatchery waste mixture (EHWM) contained crude protein and Ca contents equal to 45.49 and 8.39%, respectively and contained no microbial contaminant. It was considered safe to use it as a protein supplement. In broiler rations it might be used as a substitute for fish meal.

INTRODUCTION

Hatchery waste is all the residue remaining in the hatching trays after the salable chicks have been pulled out. This normally includes infertile eggs, eggs cracked during incubation, dead embryos, empty shells, culled chicks from broiler and egg type hatcheries. Additionally, the male chicks are also obtained as waste from egg type hatcheries. Thus at present a huge quantity of problem of hatchery waste is produced adding problem of environmental pollution. Conversion of this material into a feedstuff suitable for poultry not only would solve the pollution problem, but would also make available new animal protein source of high biological value for birds. This study was, therefore, conducted to explore the feasibility of the hatchery waste as a useful feestuff for commercial broiler chicks.

MATERIALS AND METHODS

The incubator rejects from Punjab Agricultural University hatchery were collected from both broiler and egg type hatches for the period from March to June, 1993 (Table 1).

Total reject obtained, after each hatch was pulled out, dried (in hot air oven at 80°C to a constant), grinded (in a meat grinder) and the whole lot was mixed thoroughly. Before storage, a fungistat (Copper sulphate) was mixed at the rate of @ 50g/quintal.

The hatchery waste was analysed for its chemical constituents viz., moisture, crude protein, crude fat, crude fibre, ash and calcium (Anonymous, 1980). The nitrogen free extract (NFE) was calculated by difference. After chemical analysis, the HW was mixed with soybean cake in the ratio of 40:60 and passed through an extruder at 350 psi for 10 seconds, the product at the exit indicated as temperature of 150°C. The mixture was extruder @ 5.3 kg/min. Because of quick processing the loss of nutrients was minimized. At this temperature, the disease contaminants were eliminated to render it safe for feeding. This mixture was known as extruded hatchery waste mixture (EHWM). It was also analysed for the chemical constituents in a similar way as HW.

Table 1: Detail of hatchery waste procured

Waste	Egg type chicks	Broiler chicks
Eggs		
Infertile	12911	6327
Cracked	1459	-
Empty shells	31060	15005
Chicks		
Dead in shell	11849	6320
Male	15469	-

A small smaple of EHWM was drawn and inculated in nutrient broth for bacterial isolation and incubated at 37°C for 24 hours. After 24 hours, further inoculation from nutrient broth was made on nutrient agar, eosin methylene blue agar and MacConkey's agar. Isolated colonies were stained and examined to study the morphology of organisms.

RESULTS AND DISCUSSION

The analysis of the hatchery waste is given in Table 2. It indicated that HW contained 35.49% crude protein and 20.60% calcium along with other chemical

Table 2: Chemical composition of feed ingredients (%DM basis) used in experimental ration.

Feed ingredients	Dry matter	Crude protein	Ether extract	Crude fibre	Ash	Nitrogen free extract	Calcium
Maize	89.13	9.00	3.66	2.63	1.31	83.40	0.02
Soybean cake	90.49	52.19	1.47	3.66	5.76	36.92	0.32
Fish meal	89.49	40.68	4.58	1.03	20.80	32.91	7.03
Hatchery waste*	94.66	35.49	11.43	6.37	25.40	21.31	20.60
Extruded hatchery waste mixture**	92.16	45.59	4.24	9.19	8.27	32.71	8.39

*Hatchery waste was a mixture of infertile eggs; dead in shells; empty shells from broiler and egg type hatchery and male egg type chicks.
**Extruded hatchery waste mixture was prepared from dried hatchery waste and soybean cake mixed in a ratio 40:60 before extrusion.

Table 3: Chemical composition of hatchery waste as reported by various workers

Chemical constituent	Wisman (1964)	Panda *et al.* (1965)	Panda (1977)	Vandepopuliere (1983)	Ilian and Salman (1986)	Kundu *et al.* (1986)	Ristic *et al.* (1986)
Mosture	---	8.08	9.38	65.00	---	---	8.00
Crude protein	26.00	31.10	30.52	22.20	22.80	42.26	22.40
Crude Fat	11.40	30.10	21.60	9.90	--	42.15	3.70
Crude Fibre	---	---	0.19	---	---	0.96	0.40
NFF	---	---	----	---	---	10.13	12.10
Total Ash	33.74	25.90	---	---	---	3.90	53.40
Acid Insoluble Ash	---	---	0.55	---	---	---	---
Calcium	20.60	18.10	---	24.60	22.64	---	25.94
Phosphorus	0.49	0.41	---	0.33	---	---	0.60

constituents. It also indicated that the HW may be used as protein supplement in poultry rations. The chemical composition as estimated by various workers in given in Table 3. The difference in value as obtained in the present study and those of other workers is due to the fact that the HW in the present study was made up of infertile eggs, egg cracked during incubation, dead-in-shells, empty shells and the male egg type chicks, whereas the HW obtained from other studies did not contain the male chicks. There could be another reason of hatchability of eggs for variability in the crude protein and calcium contents. The increased hatchability will contribute more empty shells and thus higher calcium and lower crude protein contents.

Since egg protein is known for high biological value (99.9%) and the amino acid profile (Vandepopuliere *et al.*, 1977; Ilian and Salman, 1986), therefore, it may replace the fish meal from poultry rations. The culture of the EHWM did not reveal any microbial contaminant and was, therefore, safe for poultry feeding.

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