



IRRADIATED POULTRY FEEDS PRODUCE MORE MEAT

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PREFACE

Production and consumption of poultry meat in Pakistan has increased tremendously during the recent years. However, due to presence of some pathogens in the commercial feeds, quality and quantity of meat produced is adversely affected and the poultry industry often suffers colossal economic losses. Decontamination of feed or food by gamma irradiation has been found very effective and economical. In view of the importance of poultry meat in human diet, studies were conducted in this Institute on the performance of broilers fed with irradiated commercial feed. The studies gave very promising results. I hope the information given in this brochure will be equally useful for poultry industry, policy makers and the consumers.

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The demand for poultry feed in Pakistan has tremendously increased with the increase in poultry industry and population. In 1990, more than 2.5 million tonnes of poultry feed was utilized. The feeds are generally enriched with protein from oilseed meals, cereal and animal sources (blood meal, fish meal, meat meal etc). However, due to unhygienic handling, processing and storage conditions, the protein sources are prone to insect and microbial infestation. The infesting microbes usually include the harmful species of *Salmonella*, *Staphylococcus aureus*, *E. coli* and *Aspergillus*. The mixed commercial feeds, therefore, act not only as a vehicle in transmission of diseases to the poultry birds but also result in suppression of their growth due to decreased palatability, consumption and digestibility. For prevention of feed related health diseases, large quantities of chemical additives are used in the feed or antibiotics are given direct to the poultry. This increases the input cost and also may cause toxic effects in the birds and subsequently in human as consumers. The effective, non-toxic, non-residual and economical measures for decontamination of feed-borne pathogens are long overdue. Radiation technology has offered an effective means to decontaminate the food/feed materials from pathogenic and other hazardous microorganisms. The treatment of food items upto a dose of 10 kGy has already been established to be safe by the FAO/IAEA/WHO expert committee. Application of nuclear energy for decontamination of food or non-food materials on commercial scale is gaining world-wide importance.

In view of problems afflicting livestock and poultry industry due to contaminated and unhygienic feeds, studies were conducted at NIFA to assess the efficacy of feeding gamma irradiated feed to broilers on their biological performance and microbial quality of the meat. To assess the initial bioburden of commercial feeds, randomly collected samples of commercial broilers rations were analysed for total bacterial and fungal counts. The data revealed a load ranging from 3.7×10^5 to 7.8×10^6 /g and 7.6×10^3 to 5.5×10^4 g of bacteria and mould respectively. Such a high bioburden is effective enough to cause poultry infections, high mortality and suppressed growth of flocks. The feed samples were irradiated with gamma rays at doses of 5.0 and 7.5 kGy. The bacterial load was drastically reduced to the range of 8.2×10^1 to 2.2×10^2 at 5 kGy and 13 to 54 TBC/g of sample at 7.5 kGy while mould content reduced to almost negligible level (Table 1).

For assessing biological performance of broilers fed on irradiated feed, 3 separate experiments were carried out at different times involving a day old chicks and gamma irradiation doses of 0, 5 and 7.5 kGy. In all the experiments, the irradiated feeds were packed in one kg polyethylene bags to prevent recontamination. The required feed and water were supplied to chicks ad libitum. The experiments were conducted for a period of 4-5 weeks at ambient temperature during winter and summer and each treatment was replicated 3 to 4 times. The data revealed consistently better performance of birds fed

on 5 kGy irradiated feed than other treated and untreated feed samples. The results of the last experiment, conducted for 4 weeks in the months of May-June involving 100 birds and 4 replicates are presented in Table-2. It is evident that the commercial broiler ration irradiated at 5 kGy yielded maximum live (22% more over control) and dressed (17% more over control) weights. The data further revealed that irradiated feed gave 17% more meat against 13% higher consumption of ration which is very economical proposition in favour of this simple technology. The additional benefit is that this technique provides pathogen-free, good quality and hygienic meat. In view of improved quality, shelf stability of meat is also improved because of lower bioload. These findings are expected to be very useful for our poultry and livestock industry by way of providing hygienic food products and meeting the protein requirements of ever growing population.

Although, at present, there is no commercial irradiator available for irradiation of poultry feed on commercial scale. However, small quantities of feed can be got irradiated from NIFA, Peshawar. Further information on this technology can also be obtained from NIFA, Peshawar. Pakistan Atomic Energy Commission is planning to install a commercial food/feed irradiator along with the existing facility at PARAS (on Multan Road) Lahore. As for the cost economics of the technology is concerned, it has been estimated that cost of irradiating one ton of feed will be around Rs. 5000/-.

TABLE 1. EFFECT OF IRRADIATION ON TOTAL MICROBIAL LOAD IN COMMERCIAL FEEDS (COUNTS/g).

Irradiation dose (kGy)	Commercial feeds							
	A		B		C		D	
	Bacteria	Mould	Bacteria	Mould	Bacteria	Mould	Bacteria	Mould
0	7.8×10^6	5.5×10^4	3.7×10^5	2.4×10^4	4.5×10^5	8.5×10^3	7.2×10^5	7.6×10^3
5	2.2×10^2	10	8.2×10^1	10	1.8×10^2	ND	1.6×10^2	ND
7.5	5.2×10^1	ND	3.5×10^1	ND	2.4×10^1	ND	1.3×10^1	ND

A-D: Feeds of different private companies.

TABLE 2: EFFECT OF IRRADIATED FEED ON THE BIOLOGICAL PERFORMANCE OF BROILERS.

Irradiation dose (kGy)	Live weight/bird (g)		Dressed weight/bird (g)		Feed consumption (g)	
	gain/bird	%-gain over control	gain/bird	%-gain over control	gain/bird	%-gain over control
Unirradiated control	828	-	491	-	1522	-
5	1008	22	573	17	1716	13
7.5	914	10	533	9	1601	5

Duration of the experiment: 4 weeks

Birds: 100

Replicates: 4