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***In vitro* Quality Assurance of Vitamin A and D in Poultry Feeds**

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Abstract

The results revealed that 42 and 40 percent feed samples contained labelled amount of vitamin A and D respectively, while 34 and 26 percent samples contained lesser amount and 26 and 32 percent samples contained excess amount of vitamin A and D in the poultry feeds.

Introduction

Vitamins are organic compounds essential for the normal functioning of the body, required in minute quantities. Vitamins regulate metabolic reactions. All vitamins are highly specific in their function. Vitamin A (Retinol) and vitamin D (Ergocalciferol vit. D₂ and Cholecalciferol vit. D₃) are fat-soluble vitamins. The principal commercial form in use is vitamin A (Retinal) and (cholecalciferol). Vitamin A is utilized promotion of growth (Raza *et al.*, 1997) maintenance of epithelial cells and vision. Vitamin D thus helps to ensure that the body has sufficient calcium and phosphorus in the blood for the normal calcification of bones (Rowland *et al.*, 1988). Vitamin A and D are important nutritional factors, which play an essential role in fulfilling the nutritional requirements of all animals particularly in the poultry, where it improves the quality of eggs (Konno *et al.*, 1984; Hart *et al.*, 1986). Vitamin A and D improves the body weight and egg laying performance, thereby, demanding an extra supplement of vitamin A and D in the rations of egg laying hens (Stevens and Blair, 1987). The present research project was undertaken to assure the quality of vitamin A and D in poultry feeds.

Materials and Methods

Fifty different feed samples of twenty feed mills were collected and extraction was carried out for three hours using chloroform as solvent at 80°C. Feed extracts were purified by column chromatography using aluminum oxide as adsorbent. An 18 percent solution of antimony trichloride (carr-price reagent) was prepared. The sample of standard vitamin A acetate (500,000 IU/g), a light yellow crystalline mass prepared by "BASF" Germany was obtained from local market and the sample of standard vitamin D₃, 40 M IU/g crystalline powder prepared by "Roche" company was obtained from Army Welfare Food Industry Faisalabad. Vitamin A and D in feed preparations was determined by using carr-price method (Hodata and Hawada, 1985). Vitamin A and D gave blue and yellow orange colour with carr-price reagent. The intensity of the colour was measured at 620 nm and 500 nm for vitamin A and D respectively.

Results and Discussion

Each feed sample was analyzed at least in triplicate. The mean absorbance values for each sample was recorded and the concentration of vitamin A and D in different feeds was calculated and converted to µg/kg of feed. An

international level and in Pakistan the concentration of vitamin A and D in feed preparations is expressed in international units (IU). For vitamin A (1 IU = 0.344 µg) and for vitamin D₃ (1 IU = 0.025 µg), The concentration of vitamin A and D in µg/kg of feed is converted to IU/kg of feed and shown in (Table 1).

The recommended concentration of vitamin A and D is (8000 IU/kg to 15000 IU/g) and (1500 IU/g to 3000 IU/g) of feed respectively (Roche Switzerland). Out of 50 samples 40 and 42 percent samples contained labelled amount of vitamin A and D to fulfill the nutritional requirement of poultry birds, 34 and 26 percent samples contained insufficient amount of vitamin A and D, 26 and 32 percent samples contained excessive amount of vitamin A and D respectively (Table 2).

Vitamin A and are an important nutritional factor, which plays an essential role in fulfilling nutritional requirements of all animals in particular the poultry, where it develops immunity against various diseases (Sijtsma *et al.*, 1989; Shinki *et al.*, 1989).

In the absence of an adequate take of vitamin A and D, a number of abnormalities and deficiency diseases appear in the poultry birds. In chicken's vitamin A deficiency causes reduced appetite, growth inhibition, weight loss, rough hair or plumage, raised cerebra spinal pressure and formation of spongy bone tissue. Deficiency of vitamin A causes Newcastle disease virus (NDV) in poultry birds. (Lessard *et al.*, 1997). Vitamin A fluorescence weaker the kupffer cells, oesophageal gland cells, oesophageal mucosa, periosteum and vascular walls of various tissues (Friedman *et al.*, 1991). The maximal immune response in poult may be achieved at dietary intake of vitamin A against NDV at or higher than those recommended by NRC (Sklan *et al.*, 1995). Vitamin D deficiency causes weight loss decreased in egg production thin-shelled eggs and reduced hatchability and soft-shelled eggs were laid. Deficiency of vitamin D in laying hens decrease thickness of the shell abruptly and numerous thin shell and soft-shelled eggs are laid (Narbaitz *et al.*, 1987). Efficiency of vitamin D compounds prevented the tibial dyschondroplasia in broiler chicken (Edwards, 1990; Elliot and Edwards, 1994). Influence of vitamin D on eggshell quality, tibia strength and various production parameters in laying hens (Frost *et al.*, 1990). The quantitative requirements of cholecalciferol are more in the absence of ultraviolet light (Edwards *et al.*, 1994). The content of inorganic phosphorus in the blood are however higher for chickens given Ekonomix D (Schleicher *et al.*, 1994). Vitamin D is very useful in the treatment of different diseases in poultry farms (Saxena and Chandna, 1996).

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Table 1: Showing the concentration of vitamin A and D in IU/kg of poultry feed

Sr.	Feed Manufacturers Address		Feed Number Sample Type	1	2	3	4 or 9	5 or 10	6 or 8#
				Chick mesh	Grower	Layer	Broiler starter	Broiler	Breeder
1	Ani Feeds	Gujranwala	A	12653		14570	14264	12730	
			D	1830		3035	3660	4880	
2	Chenab Feeds	Faisalabad	A	13037		13037	10199	14033	14264
			D	1830		3660	5734	2440	6100
3	Crescent Feeds	Faisalabad	A	17101	9432	13803			
			D	3660	3050	5734			
4	Hi-Grow Feeds	Lahore	A			14570	4064		
			D			2440	1830		
5	1-ii-Tech Feeds	Lahore	A				15030	10736	
			D				6100	1830	
6	Kakation Feeds	Lahore	A	16334		16334	13497		
			D	3050		1830	3660		
7	Lahore Feeds	Lahore	A				15567	9432	
			D				3050	5734	
8	National Feeds	Lahore	A				11963	4831	
			D				3050	3660	
9	Nice Feeds	Faisalabad	A			10199	8129	7899	
			D			2440	1830	3050	
10	Pakistan Feeds	Lahore	A				14570		11503
			D				1830		3050
11	Pasban Feeds	Okara	A	9432			6595	7897	
			D	2440			1830	3050	
12	Punjab Feeds	Lahore	A				13264	17331	
			D				6466	1830	
13	Qadria Feeds	Okara	A			10429	11503		
			D			3050	3050		
14	Ravi Feeds	Lahore	A	10736			6365		
			D	5734			4148		
15	Rehman Feeds	Faisalabad	A	16871		12500	7362		
			D	3050		2440	1830		
16	Satlug Feeds	Bahawalpur	A	14264			11503	9202	12500
			D	1220			3660	3660	3050
17	Super Feeds	Bahawalpur	A	15337			5828	13267	
			D	4148			3050	6100	
18	Supreme Feeds	Faisalabad	A						6902
			D						4148
19	Umda Feeds	Gujranwala	A				10736		
			D				3050		
20	Wages Feeds	Okara	A			13803			
			D			6100			
Recommended Concentration of Vitamin A				12000	8000-	10000-	12000-	10000-	12500-
				15000	10000	12500	15000	12000	15000
Recommended Concentration of Vitamin D				2500-	1500-	2000-	2500	2000	2500-
				3000	2000	2500	3000-	3000	3000

Table 2: Showing the percentage and number of vitamin A and D of each group in poultry feed

Name of each group	Chick mesh		Grower		Layer		Broiler starter		Broiler		Breeder		Total		Percent	
	A	D	A	D	A	D	A	D	A	D	A	D	A	D	A	D
Groups containing recommended concentration	3	4	1	1	5	4	7	8	4	3	1	1	20	21	40	42
Groups containing low concentration	4	2	0	0	2	2	4	7	3	4	0	2	17	13	34	26
Groups containing high concentration	2	3	1	1	4	5	5	1	2	2	2	0	13	16	26	32
Total number of each group	9		2		11		16		9		3		50		100	
															%	%

Vitamin A and D should be provided only in suitable amounts. Over dosage of vitamin A and D results in a number of manifestation and toxicity. Excessive vitamin A intake decreases osteoblastic activity and inhibits bone formation in chick tibia. (Kannan *et al.*, 1998), impaired

skeletal formation (Saleh *et al.*, 1995).

Poultry birds fed substandard feeds for long periods are bound to suffer from different diseases, it may be due to the addition of lesser amounts of vitamin mineral into the feed during its formulation or it may be due to the

subsequent destruction of the vitamin on storage. Due to above facts, special attention should be given towards the storage conditions of poultry preparations. During storage proper temperature should be maintained and arrangements should be done to protect the feed preparations from light, moisture and other environmental condition.

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