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Studies on the effect of *Lactobacillus* with and without supplementation of live yeast on growth performance of broilers in arid zone of Rajasthan

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Abstract
An experiment was conducted utilizing 180 broiler chicks from day one to 6 weeks of age. These were randomly distributed into four treatment groups of 45 chicks with three replicate having 15 chicks in each, to study the effect of lactobacillus (0.02%) with and without supplementation of live yeast (0.2%) on the live performance carcass traits. From the study it was observed that supplementation of *lactobacillus*, live yeast alone or in combination had statistically non-significant effect on growth performance, feed consumption, feed efficiency and per cent mortality of chicks. The body weight gain was maximum influenced by live yeast 1437.25±13.45g (T3) followed by combined feeding of lactobacillus and live yeast (T4), and lactobacillus (T2), while least body weight gain was observed by chicks in the control group 1429.72± 14.00g (T 1), respectively. The total average feed consumption through out the experiment (0-6weeks) showed that the maximum feed intake was recorded in T4 group (3285.70g) succeeded by T 3 (3260.34g) and T2 group (3230.78g). Minimum intake was observed in group T1 (3126.43g).Cumulative feed conversion ratio (1-6 weeks) of control (T 1) (2.18± 0.84) was slightly better as compared to Lactobacillus (T 2) (2.25 ± 0.06) because the body weight was comparatively higher in T 2 group as compared to control and the feed conversion ratio is inversely proportional to body weight, but statistically both are non-significant. The feed conversion ratio of T 3 and T 4 group was found to be 2.26± 0.09 and2.28± 0.04 respectively. Thus it was concluded that supplementation of *lactobacillus*, live yeast alone or in combination had no effect on growth performance, feed consumption and feed conversion ratio.

Keywords: *Lactobacillus*, Broilers, Probiotics

1. Introduction
One of the most important and rewarding commercial section of poultry industry is broiler production which is at present progressing at maximum rate in the country. This is probably due to the fact that it requires low capital investment, shorter cycle of production, early assured returns, lesser risk, remunerative prices and ever increasing demand of broiler meat. The annual growth rate is 8-10% in egg and 12-15% in the broiler industry. With the annual production of 33 billion eggs, India is the fifth world's largest egg producing country. It also produces 530 million broilers per year. The annual per capita consumption in India is only 33 eggs and 630 grams of poultry meat.

The liberal government support for poultry farmers also played an important role. The gradual change in living standard of people also brought about the change in feeding habit of people who can readily afford to pay for nutritive food. It is a glorious period so far as the development of broiler industry is concerned.

The possibility of antibiotics ceasing to be used as growth stimulants in poultry feed has induced a climate in which both consumer and manufacturers are looking for alternatives. Probiotics are such natural alternatives to antibiotics for better animal production and performance (Banday *et al*. 2002 and Bansal, *et al*. 2011) [1, 2]. Probiotics are organisms or substances which contribute to the intestinal microbial balance, regulate the gut ecology and hence, the microbial environment improves feed utilization resulting in increased production **(**Parker, 1974; Fuller, 1977; Jadhav, 1992**)** [9, 4, 6]**.** There are different probiotics like- strains of *lactobacillus*, enzymes, live yeast etc which are now a days used in supplementation of poultry ration (Watkins *et al.*1984) [10]. In poultry, Lactobacilli attach themselves to the crop

epithelium and multiply (Zhang *et al*.2014) [12]. This adhering population of organisms serves to inoculate the incoming food and ensures dominance of lactobacilli for the suppression of enteropathogens like *E. coli.* They significantly reduced chick mortality and shedding of pathogens experimentally infected with *Salmonella typhimurium* (Watkins *et al*., 1982) [11]**.** Recently probiotics have been acclaimed as pH adjusters which contribute to maintain balanced intestinal microflora, which in turn stimulate growth and improve feed efficiency (Jernigan *et al.*, 1985 and Buche, 1990) [7, 3]. In the present study Lactobacillus sporogenes and live yeast have been incorporated both individually and together as a combination, as probiotics for feed supplementation in broilers (Gandhi *et al.*1988) [5].

Materials and methods

The present study was undertaken to find out the effect of *Lactobacillus* and live yeast, alone or in combination as the feed supplement on live performance and carcass traits of broiler chicks. The experiment was carried out upto 6 weeks of age during month of April at Poultry Farm, college of Veterinary and Animal Science, Bikaner.

Experimental chicks and their management

Freshly hatched, apparently healthy, day old unsexed 180 commercial chicks (Cobb strain) procured from Government Poultry Farm, Jaipur were used in the present investigation. All the chicks were individually weighed and randomly divided into 4 treatment groups including one that of control. Each group having 45 broiler chicks, was further sub-divided into 3 replicates of 15 chicks. Each replicate (sub group) of 15 chicks were reared in 12 separate, clean and disinfected floor pens allotted randomly. All the chicks were reared under identical standard management practices like brooding, feeding, watering, lighting, health care etc. During the entire course of study.

The broiler chicks were fed starter ration (procured from Venkeys) upto the age of 3 weeks and there after broiler finisher ration (procured from Venkeys) was given till the culmination of the experiment. i.e. upto 6 weeks of age. Feed and fresh water were offered *ad libitum* to each group throughout the experimental period.

Experimental feeding groups

The different experimental feeding groups diets were formulated as mentioned in Table 1

Table 1: Experimental feeding groups

Treatment	Probiotic used	Dose of probiotics
T1	Nil (control group)	
T2	*Lactobacillus sporogenes*	0.02%
T3	Live yeast	0.2%
T4	*Lactobacillus sporogenes* + Live yeast (combination)	0.02% + 0.2%

The first feeding group (T 1) was kept as the control and no probiotic was supplemented to the starter and finisher basal ration. In the second group (T2) Lactiobacillus *(Lactobacillus sporogenes*) as Sporlac was incorporated at the dose rate of 20 g per quintal of feed to give an active concentration of 0.02% in thefeed. In the third group (T3), live yeast culture procured from market was mixed with ration at the dose rate of 200g per quintal of feed to give an active concentration of 0.2% in the feed. In the fourth group (T4) a combination of Lactobacillus at the rate 20g per quintal and live yeast at rate of 200g per quintal of feed to give an active concentration of 0.02% of *Lactobacillus* and 0.2% of live yeast in the feed, respectively.

Following observations were recorded during the whole experimental period.

Body weight: The individual body weight of all the chicks was recorded (in g) at the commencement of experiment and subsequently at weekly interval upto six weeks of age.

Weight gain: The weekly live weight gain was calculated from the difference in body weight attained at the end of the period and at the start of the period in question.

Feed consumption: The weekly feed consumption of chicks of each pen was recorded and average feed intake in g/chick/pen was calculated by dividing the total amount of feed consumed by number of chicks in the particular pen.

Feed conversion ratio: Feed conversion ratio was calculated at 2nd, 4th and 6th week of age by dividing the cummulative feed intake by total live body weight of chicks that particular period of time.

Result and Discussion

Following results were observed to see the effect of *Lactobacillus* and live yeast alone or in combination as feed supplement on live performance of broiler chicks. The body weight, weight gain, feed consumption, feed conversion ratio, was calculated at the end of experiment. The temperature and humidity was recorded daily as these were the most important variable factors affecting the study.

A. Body weight

The analysis of variance for body weight showed non-significant effect of treatment from first week upto sixth week of experiment i.e. the effect of treatment was found to be non-significant throughout the period under study (Table 2). The mean body weight of broiler chicks at the culmination of experiment i.e. after sixth week was highest (1493.84± 47.03g) in T3 group and lowest (1486.33 ± 43.50g) in T l group. The average body weight of T2 and T4 group were intermediate. However, differences among all the four groups were insignificant. The average body weight was influenced maximum by live yeast followed by combination of *Lactobacillus* and live yeast *Lactobacillus* while the lowest body weight was observed in control group. The Analysis of variance for study for body weight gain revealed that the effect of different treatments was also found to be non-significant (Johri *et al.*1996) [8].

Table 2: Treatment means with standard error for body weight (g/chick) in different weeks of experiment

Age in Weeks	Treatment			
	T 1	T 2	T 3	T 4
3rd day	56.61 ±0.25	56.50 ± 0.20	56.59 ±0.24	56.68 ±0.27
1	117.19 ±4.06	114.56 ± 3.23	112.30 ±3.56	121.67 ± 3.40
2	239.53 ± 9.06	230.73 ± 8.34	234.43 ±5.91	240.52 ±7.70
3	465.44 ± 16.66	468.21 ± 13.92	488.80 ± 18.52	469.22 +15.81
4	806.42 ±30.49	817.69 ±23.69	849.99 ±37.21	844.99 ±30.45
5	1215.13 ± 45.68	1185.47 ± 40.79	1252.73 ± 50.16	1237.97 ± 45.37
6	1486.33 ± 43.50	1488.94 ± 36.07	1493.84 ± 47.03	1492.30 ± 49.12

B. Weight gain

The cumulative weight gain of 1437.25± 13.45g was maximum influenced by the live yeast culture, followed by combination of lactobacillus and live yeast 1435.62 ± 11.74g and *lactobacillus* 1432.44± 13.68g while the lowest body weight gain of 1429.72± 14.0g was observed in the control group (Table 3**)**.

Table 3: Treatment means with standard error for body weight gain (g/ chick) in different weeks of experiment

Age in Weeks	Treatment			
	T 1	T 2	T 3	T 4
1	61.00 ± 3.87	58.10 ± 3.11	56.53 ± 3.41	64.00 ± 3.26
2	122.33 ± 5.55	116.21 ± 6.01	121.22 ± 5.44	118.86 ± 4.33
3	225.91 ± 15.43	237.47 ± 9.96	254.37 ±13.45	228.45 ± 9.19
4	340.97 ± 17.48	349.42 ±20.30	361.42 ±20.41	375.76 ± 17.87
5	408.71 ±21.87	367.82 ± 19.55	402.73 ±17.71	393.44 ±18.48
6	254.44 ± 19.81	292.73 ±23.19	247.12 ±20.28	257.81 ±16.98
1-6	1429.72 ± 14.00	1432.44 ± 13.68	1437.25 ± 13.45	1435.62 ± 11.74

C. Feed conversion ratio

The total average feed consumption throughout the experiment (0-6) showed(Table 4) that the maximum feed intake of 3285.87± 7.39g was recorded in T4 group succeded by T 3 group (3260.34± 10.33g) and T 2 group(3230.78± 16.84g). The minimum feed intake was observed in group TI ((31 26.43 ± 12.37g) though the differences among all the four treatment groups were found to be non-significant. Overall results of feed intake reveals that the average feed intake per chick showed an increasing trend in all the groups from first week of experiment upto fifth week, but thereafter the feed intake markedly declined in sixth week. This may probably be due to high environmental temperature recorded during last week of experiment. Another peculiar thing observed was that feeding of lactobacillus and live yeast alone or in combination almost increased the average weekly feed consumption as compared to the chicks of control group. Though, the differences were found to be statistically not significant. The analysis of variance revealed that the effect of various treatments on feed efficiency was found to be insignificant at 2nd, 4th and 6th week of experiment.

Table 4: Treatment means with standard error for weekly feed consumption (g/ chick) in different weeks of experiment.

Age in Weeks	Treatment			
	T 1	T 2	T 3	T 4
1	137.61 ± 2.28	133.16 ± 1.83	134.91 ±2.77	147.77 ± 1.81
2	263.80 ± 4.42	274.60 ± 3.24	272.37 ± 6.07	259.04 ± 3.24
3	454.75 ± 4.19	463.16 ± 6.74	467.77 ± 6.13	469.99 ± 4.42
4	694.44 ± 23.56	722.37 ±25.85	730.95 ±10.29	743.01 ±20.92
5	918.88 ±12.81	922.06 ± 21.60	945.23 ± 10.30	942.85 ± 6.74
6	657.14 ± 26.96	715.43 ± 41.79	708.97 ± 26.44	723.07 ± 7.26
1-6	3126.43 ±22.37	3230.78 ±26.84	3260.34 ±30.33	3285.70 ± 27.39

The overall findings of feed conversion ratio (Table 5**)** revealed that there is no significant effect of supplementation of *lactobacillus* or yeast, or combination of *lactobacillus* and yeast on feed conversion efficiency of broiler chicks. Cumulative feed conversion ratio (1-6 weeks) of control group (2.18 ± 0.84) was slightly better as compared to *lactobacillu*s group (2.25 ±0.06) because the body weight was comparatively higher in T2 group as compared with control and the feed conversion ratio is inversely proportional to body weight, but statistically both are non-significant. The feed conversion ratio of T 3 and T4 group was observed to be 2.26± 0.09 and 2.28± 0.04 respectively.

Table 5: Treatment means with standard error of feed conversion ratio in broilers at second, fourth and sixth week of experiment.

Treatment	Age in weeks			
	2	4	6	1-6
T 1	2.16 ± 0.08	2.04 ± 0.10	2.57 ± 0.08	2.18 ± 0.84
T 2	2.36± 0.05	2.07± 0.08	2.55± 0.26	2.25± 0.06
T 3	2.24± 0.06	2.02± 0.04	2.87± 0.04	2.26± 0.09
T 4	2.47 ± 0.04	2.11 ± 0.85	2.80± 0.05	2.28± 0.04

Conclusion

From the study it was concluded that supplementation of *lactobacillus*, live yeast alone or in combination had no effect on growth performance, feed consumption and feed conversion ratio. But inconsistency in the results of literature reviewed on growth, feed consumption, feed conversion efficiency etc. may be attributed to the fact that both genetic (different strains of broilers used) and non-genetic factors like season of experiment, level of incorporation, strains of microbes, composition of ration etc. may also be playing an important role in experiment of the type.

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