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ORIGINAL ARTICLE

Individual and Combined Efficacy of Antibiotics and Probiotics on the Growth of Broiler Chicken

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ABSTRACT

In Pakistan the poultry industry continues to grow to meet the demand for poultry products in world markets therefore, there is need for using probiotics instead of antibiotics to have maximum benefits. The present research work was carried out to study the effect of antibiotic and probiotic in combination and alone on the growth performance of broiler chickens. The effect of antibiotic and probiotic on the body weight gain, feed intake and feed conversion ratio was noted in all the birds. The study was conducted on 300 broilers chickens were divided into 10 groups. Nine of them having 25 birds with the control group having 75 birds. The antibiotic group was named A (A1, A2 and A3). In which A1 was received 150 mg Neomycin/kg feed, A2 was 200mg Neomycin/kg feed and A3 was 250 mg Neomycin/kg respectively. The probiotic group was named "B" and it was further sub divided into B1, B2 and B3. In which B1 was offered 1.5g Protexin/kg feed, B2 was offered 2g Protexin/ kg feed and B3 was 2.5g Protexin/kg feed. The group that received both antibiotic and probiotic was named C and was further divided into C1, C2 and C3. In which C1 was offered 150mg Neomycin and 1.5g Protexin/kg feed, C2 was offered 200 mg Neomycin and 2g Protexin/ kg feed and C3 was offered 250 mg Neomycin and 2.5 g Protexin/kg feed. We concluded that Neomycin antibiotic has not such better effect on the body weight gain, feed intake and feed conversion ratio. Protexin probiotic given alone improves the body weight gain, feed intake and feed conversion ratio. And the best result obtain was that of antibiotic and probiotic given in combination which significantly improves the body weight gain, feed intake and feed conversion ratio.

INTRODUCTION

As the human population increases, the poultry industry continues to grow to meet the demand for poultry products in world markets. The importance of poultry farms lies in the quality of products that are provided to humans. Broiler farms provide meat that supplies the human body with high quality proteins. The poultry sector continues to grow and industrialize in many parts of the world. An increasing population, greater purchasing power and urbanization have been strong drivers of growth (FAO, 2017). Poultry industry has become one of the largest livestock industries throughout the world, with a 44% production increase in the U.S between 1982 and 1994 (Williams et al., 1999).

Worldwide research on the production of meat point's outs that in the developing countries poultry is one of the rapid growing livestock sector (Tiessen et al., 2011; Taha, 2003; Landes et al., 2004; Conroy, 2004). Poultry business is beneficial, profitable and having glorious prospects of increasing the accessibility to high quality protein for the consumption of humans in a short period of time, also for food it is the easiest and cheapest source of protein (Alam, 2000; Udoh and Etim, 2007). Pakistan economy is largely based on agriculture. More than half of the population inhabits rural areas and depend upon agriculture either directly or indirectly, for their living. Industrial sector is largely dependent upon agriculture for its products. Experience from past depicts stated that agriculture growth is directly proportional to the national economy (Ali, 2000).

Poultry production in Pakistan is one of the most active and well organized sectors contributing 26.8%, 5.76%, and 1.26% respectively of total meat production, agricultural sector and overall GDP and in the last few year's poultry sector has shown excellent growth and has emerged as a source of employment for more than 1.5 million people (Sheikh, 2010). Poultry sector in Pakistan is growing with an average rate of 8-10% annually (Ahmed et al., 2009). In Pakistan every family living in the rural areas and some families living in the urban areas are involved in poultry production (Sadiq, 2004; Numan et al., 2005). Broilers chickens are given a specific feed for their better growth which contain a balanced nutrient profile, particularly proteins and amino acids and due to the more requirement of meat the production of broilers are getting up to the mark each year (Kleyn and Chrystal, 2008).

The government of Pakistan considered poultry production sector as a key part of the food processing industry and gave special incentives to this sector, and so the poultry sector was declared as free of sales and income tax as well as exempt from import duties for a number of years (Sadiq, 2004). The major growth in compositing and production of broiler chickens in the developing countries has an important effect on the global trading of all meat products, as wll as feeds and related inputs (Taha, 2003; Landes et al., 2004). In spite of the many advantages and the positive market outlook the world broiler sector faces increasing challenges just like animal welfare, product quality, environmental issues associated with industrialized poultry production system and food safety (Shane, 2004).

Probiotics are used in human beings, animals and birds to improve their health, and in animal's production system they are used to improve the health status and along with them to improve their feed conversion efficiency, immune responses and production performances especially in swine, cattle's and poultry (Sabatkova et al., 2008). Probiotics that are added as a feed additive have been recommended as a safe to be used as growth promoter in animals (Bansal et al., 2011). In poultry production the newly hatched chicks have slight chances of contact with their mother, so they obtain microflora from the environment and hence normal microflora colonization in the intestine is slow, so the hatched chicks may get infected at this particular time, here the concept of probiotics supplementation develops and is having vast benefits (Pivnick and Nurmi, 1982; Lee et al., 2006; Dhama and Singh, 2010).

The use of antibiotics as growth promoting agents in poultry has been banned in Europe, and due to the vast detrimental effects of antibiotics they have gradually been replaced by probiotics (Fuller. 1992; Patterson and Burkholder, 2003; Dhama et al., 2007, 2008; Sabatkova et al., 2008; Dhama and Singh,

2010). A wide range of microbial species for example Bifidobacterium, Enterococcus, Escherichia, Lactobacillus, Lactococcus, Streptococcus, Saccharomyces and Bacillus and also their mixed cultures have been used as probiotics, of which Bacillus, Enterococcus and Saccharomyces species are most commonly used organisms in livestock, while Lactobacillus and Bifidobacterium species have been used most widely in humans (Simon et al., 2001).

Aims and Objectives

1. The effect of Antibiotic on health, growth and FCR of broilers chickens.
2. The effect of Probiotic on health, growth and FCR of broilers chickens.
3. Combine effect of Antibiotic and Probiotic on health, growth and FCR of broilers chickens.

MATERIALS AND METHODS

Study Design: A total number of 300 bird's broiler chickens of Cobb 500 breed were purchased from the local market and these birds were kept at experimental sheds of Poultry Research Institute (PRI), Jabba Mansehra in standard management conditions.

Preparation of House: A control shed was partitioned to 4 pens of equal size A, B, C and D by using expanded wire and bamboo materials. The first three pens A, B and C were further divided into 3 pens of equal size (A1, A2 A3) (B1, B2, B3) (C1, C2, C3) and the fourth pen D was remained as such. The pens were thoroughly brushed, swiped and washed by water. After washing with clean water, the pens were disinfected by virkon solution. Then the room were left vacant for 10 days. During this time, all feeders, drinkers and other necessary equipment's were properly cleaned, washed and disinfected with virkon solution, subsequently dried and left for 3 days before use. After arrival of the baby chicks 25 birds each were placed in (A1, A2, and A3) (B1, B2, and B3) (C1, C2, and C3) pens and 75 birds were placed in D pen.

Group A: Birds of this group was treated with neomycin and further divided into 4 separate sub groups A1, A2, A3 and A4. The initial body weight of these birds were noted and A1 were offered with 150 mg Neomycin / kg feed, A2 were offered with 200 mg Neomycin / kg feed and A3 were offered with 250 mg Neomycin / kg feed.

Group B: Birds of this group were treated with probiotic (Protexin) and further divided into 4 separate sub groups B1, B2, and B3. The initial body weight of these birds were noted and B1 were offered with 1.5 gm probiotic (Protexin)/kg feed, B2 were offered with 2 gm probiotic (Protexin)/kg feed and B3 were offered with 2.5 gm probiotic (Protexin)/kg feed.

Group C: Birds of this group were treated with both neomycin and probiotic (Protexin) and were further sub divided into 4 separate sub groups C1, C2 and C3. The initial body weight of these birds were noted and C1 were offered with 150 mg Neomycin/ kg feed and 1.5 gm probiotic (Protexin)/ kg feed. C2 were offered with 200 mg Neomycin/ kg feed and 2 gm probiotic (Protexin)/kg feed and C3 were offered with 250 mg Neomycin/ kg feed and 2.5 gm probiotic (Protexin)/kg feed.

Group D: Birds of these group were treated as control and these birds were only provided with standard ration.

Experimental Feeds: The birds were provided with standard feeding and Hi-tech feed were provided to the birds according to the standard amount throughout the experimental period.

Litter Management: Fresh rice husk at a depth of 3 cm was used as a litter material and was placed in the pens 2 days earlier before arrival of the baby chicks. The litter was disinfected with virkon solution. Litter material when found damp was replaced by new litter.

Temperature Management: The temperature of the birds were maintained according to the required temperature and a thermometer was placed just above the bird's level at the center of each pen. The temperature was set according to the following values, (a) 95^{o} F temperature was maintained throughout the first week, (b) 90^{o}F temperature was maintained throughout the second week, (c) 85^{o} F temperature was maintained throughout the third week, (d) 80^{o}F temperature was maintained throughout the fourth week, and (e) 75^{o}F temperature was maintained throughout the fifth week, (f) 70^{o} F temperature was maintained throughout the sixth week.

Brooding and Lighting: The birds were brooded separately in each pen with one 100 watt electric bulb from days first to day 7. The bulb was hanged just above the bird's level at the center of each pen. Brooding temperature was kept 35^{o} F at the beginning of the first week of age and decreased gradually in each subsequent week.

Feeder and Drinkers Management: During first 3 days the feed was provided on newspaper and after 3 days feed was provided in long trough and water was provided in small drinkers. After brooding the trough were replaced by large feeders and the small drinkers were replaced by large drinkers. The feeders and drinkers were provided separately in all the pens.

Feeding and Drinking: Immediately after distribution of the chicks in the pens, 5% glucose solution was provided to the chicks for 3 to 4 hours. Then after 3 to 4 hours neomycin was mixed thoroughly with feed and provided to partition A1, A2 and A3 and probiotic (Protexin) was thoroughly mixed with feed and provided to B1, B2 and B3 and neomycin and probiotic (Protexin) combine were mixed thoroughly with feed and provided to C1, C2 and C3 and only feed were provided to the chicks in partition D.

Vaccination: The experimental birds were vaccinated as following: (1) on day 1 all the birds were vaccinated against Newcastle Disease (ND). The vaccine was done by giving one drop in eye. (2) On day 5 Oil base vaccine Al H9+ND was done. All the birds were sub cutaneous vaccinated with 0.3 ml Al H9+ND vaccine for prevention against Influenza Virus and Newcastle Disease. (3) On day 8 Gumboro Intermediate was done. All the birds were vaccinated against Gumboro Disease. The vaccine was done by giving one drop in eye. (4) On day 14 IB-Ma5+ND Clone-30 vaccine was done. All the birds were vaccinated against Infectious Bursal and Newcastle Disease. The vaccine was done by giving one drop in eye. (5) On day 16 Gumboro Intermediate plus vaccine was done. All the birds were vaccinated against Gumboro Disease. The vaccine was done by doing one drop in the eye. (6) On day 20 Hydro vaccine was done. All the birds were sub cutaneously vaccinated with 0.3 ml Hydro vaccine for prevention against Hydro Pericardium Syndrome.

Sanitation and Bio-security: Adequate hygiene and sanitation were maintained during the study period. Drinkers and feeders were washed with clean tap water every morning. The room ally was swiped once daily. A gunny bag was placed at the entrance of the room soaked with bleaching powder solution all the time. All the equipment's of the house were kept clean. Before entrance, hand and feed were properly washed and proper clothing and gloves and mask was used all the time during working.

Body Weight Gain: The body weight gain was calculated biweekly. The body weight gain was calculated as

Body Weight Gain= Final Weight – Initial Weight

Feed Intake: Feed intake for each replicate was calculated on weekly basis as the amount of feed offered and amount of feed remaining in the feeders.

Feed Intake = Feed offered – Feed remaining

Feed Conversion Ratio (FCR): On the basis of weekly weight gain and feed intake Feed Conversion Ratio was calculated.

Feed Conversion Ratio (FCR) = Total Feed Intake/ Total weight Gain

Other Organs Weight: At the end of experimental period bird from each replicate was slaughtered and after complete bleeding and plucking the internal organ heart, gizzard, liver, spleen were removed and weighted and remaining carcass weight were calculated including giblets.

RESULTS

Body Weight: In the present study the body weight of the birds was calculated by taking 10 birds from each partition in the tub and

then placed on a weight balance. The weight of the tub was noted first. The total weight of 10 birds including the tub was noted and then the tub weight was subtracted from the total weight. The average weight of single bird was calculated twice a week. The body weights are shown in Table 3.1. And it was noted that C group receiving combination of antibiotic and probiotic were having highest body weight as C1 2780 g/bird, C2 2860 g/bird and C3 2930 g/bird. The body weights of group B receiving only probiotic Protexin were less then C group as B1 2610 g/bird, B2 2684 g/bird and B3 2748 g/bird. The body weights of A group receiving only antibiotic Neomycin were less than B group as A1 2442 g/bird, A2 2496 g/bird and A3 2550 g/bird. And the body weights of control group D were lowest of the all as 2360 g/bird.

Table 1: Body Weight per bird in grams

Days	A1	A2	A3	B1	B2	B3	C1	C2	C3	D
1st	49g	49g	49g	49g	49g	49g	49g	49g	49g	49g
4th	88g	90g	91g	90g	92g	95g	92g	94g	98g	85g
7th	156g	160g	164g	163g	168g	173g	167g	170g	174g	152g
11th	282g	286g	292g	292g	298g	305g	306g	314g	322g	275g
14th	405g	410g	420g	425g	432g	440g	440g	448g	455g	400g
18th	646g	655g	668g	672g	682g	694g	696g	708g	720g	632g
21st	884g	896g	912g	922g	938g	954g	960g	980g	998g	862g
25th	1205g	1222g	1232g	1258g	1280g	1304g	1308g	1344g	1370g	1172g
28th	1428g	1452g	1468g	1498g	1530g	1560g	1572g	1614g	1650g	1390g
32nd	1806g	1836g	1860g	1894g	1935g	1974g	1992g	2044g	2088g	1760g
35th	2046g	2084g	2114g	2158g	2210g	2260g	2284g	2345g	2398g	1990g
39th	2250g	2298g	2340g	2390g	2450g	2508g	2536g	2605g	2665g	2180g
42nd	2442g	2496g	2550g	2610g	2684g	2748g	2780g	2860g	2930g	2360g

Body Weight Gain: The body weight was calculated biweekly. The body weight gain of every groups are shown in Table 3.2. In the end it was observed that C group receiving combination of antibiotic and probiotic were having highest body weight gain as C1 244 g/bird, C2 255 g/bird and C3 265 g/bird. The body weight gain of group B receiving only probiotic Protexin were less then C group as B1 220 g/bird, B2 234 g/bird and B3 240 g/bird. The body weight gain of A group receiving only antibiotic Neomycin were less than B group as A1 192 g/bird, A2 198 g/bird and A3 210 g/bird. And the body weight gain of control group D were lowest of the all as 180 g/bird. The body weight gain was calculated as, (Body Weight Gain = Final weight – Initial weight)

Table 2: Body Weights Gain per bird in gram

Day	A1	A2	A3	B1	B2	B3	C1	C2	C3	D
4th	39g	41g	42g	41g	43g	46g	43g	45g	49g	36g
7th	68g	70g	73g	73g	76g	78g	73g	76g	76g	67g
11th	126g	126g	128g	129g	130g	132g	139g	144g	148g	123g
14th	123g	124g	128g	133g	136g	139g	135g	139g	141g	122g
18th	241g	245g	248g	247g	250g	254g	256g	260g	265g	232g
21st	238g	241g	244g	250g	256g	260g	264g	272g	278g	230g
25th	321g	326g	330g	336g	342g	350g	354g	364g	372g	310g
28th	223g	230g	236g	240g	250g	256g	264g	270g	280g	218g
32nd	378g	384g	392g	396g	405g	414g	420g	430g	438g	370g
35th	240g	248g	254g	264g	275g	286g	292g	301g	310g	230g
39th	204g	214g	226g	232g	240g	248g	252g	260g	267g	190g
42nd	192g	198g	210g	220g	234g	240g	244g	255g	265g	180g

Feed Intake: The feed intake was calculate twice a week. And in the end it was noted that C group receiving combination of antibiotic and probiotic were having highest feed intake as C1 4940 g/bird, C2 4945 g/bird and C3 4950 g/bird. The feed intake of group B receiving only probiotic Protexin were less then C group as B1 4928 g/bird, B2 4932 g/bird and B3 4936 g/bird. The feed intake of A group receiving only antibiotic Neomycin were less than B group as A1 4908 g/bird, A2 4915 g/bird and A3 4921 g/bird. And the feed intake of control group D were the lowest of the all as 4900 g/bird. The feed intake was calculated by the formula (Feed Intake = Feed offered – Feed remaining)

Table 3: Feed Intake per bird in grams

Week	A1	A2	A3	B1	B2	B3	C1	C2	C3	D
1st	140g	142g	144g	142g	145g	148g	140g	145g	145g	139g
2nd	503g	505g	510g	513g	515g	516g	517g	520g	522g	500g
3rd	1155g	1160g	1166g	1170g	1176g	1180g	1182g	1186g	1190g	1142g
4th	2142g	2148g	2151g	2156g	2161g	2168g	2172g	2178g	2185g	2130g
5th	3410g	3413g	3418g	3423g	3428g	3431g	3435g	3441g	3446g	3392g
6th	4908g	4915g	4921g	4928g	4932g	4936g	4940g	4945g	4950g	4900g

Feed Conversion Ratio (FCR): Feed conversion ratio was calculated once a week. Feed conversion ratio of each group is shown in Table 3.4. On the basis of weekly weight gain and feed intake Feed conversion Ratio (FCR) was checked. The lowest value represent best FCR. So in the end it was observed that C group receiving combination of antibiotic and probiotic were having lowest FCR as C1 9.96/bird, C2 9.60/bird and C3 9.30 /bird. The FCR of group B receiving only probiotic Protexin were higher then C group as B1 10.9/bird, B2 10.4/bird and B3 10.1/bird. The FCR of A group receiving only antibiotic Neomycin were higher than B group as A1 12.4/bird, A2 11.9/bird and A3 11.3/bird. And the FCR of control group D were highest of the all as 13.2/bird.

Table 4: Feed Conversion Ratio per bird

Week	A1	A2	A3	B1	B2	B3	C1	C2	C3	D
1st	1.31	1.28	1.25	1.24	1.22	1.19	1.20	1.20	1.16	1.35
2nd	2.03	2.03	1.99	1.96	1.95	1.93	1.89	1.87	1.86	2.02

3rd	2.41	2.39	2.37	2.35	2.32	2.29	2.27	2.23	2.20	2.47
4th	3.94	3.86	3.86	3.74	3.65	3.58	3.55	3.43	3.35	4.03
5th	5.52	5.40	5.29	5.18	5.04	4.90	4.82	4.70	4.61	6.65
6th	12.4	11.9	11.3	10.9	10.4	10.1	9.96	9.60	9.30	13.2

DISCUSSION

Previously conducted studies presented that Neomycin in the diets of broilers chicks significantly improves the live body weight and body weight gain as compared to those not supplemented with Neomycin (El-Hindawy et al., (2001). Abdel- Azeem, (2002) studied the effect of Neomycin as growth promoter in broilers chickens and found that it significantly improved their growth performances. El-Gendi et al., (2000) observed that Neomycin given to broilers chickens slightly improved their feed conversion ratio.

Vargas et al., (2001) noticed that antibiotics in the diets of broilers did not improve the feed conversion ratio. This may be due to the reason that in some circumstances antibiotics provokes an immune response which causes appetite. The study conducted by Gaskins et al., (2002) stated that, dietary antibiotics have beneficial effect on poultry growth, inhibition of pathogens growth and feed conversion.

Dibner and Richards, (2005) observed that antibiotics used in the feed of broilers chickens allows better growth performances. The study conducted by Flemming and Freitas, (2005) stated that, antibiotic in broilers diet has no positive effect on their weight gain and feed conversion ratio. This may be due to the fact that antibiotics lowers the digestive efficiency by degrading the digestive enzymes and reducing the absorptive surface areas. Correa et al., (2003) stated that neomycin has no effect on the feed conversion ratio of broilers. This may be due been growing concern that the use of antibiotics as growth promoters is resulting in the development of resistant populations of bacteria which make the use of antibiotics therapy difficult.

The study conducted by Chen et al., (2009) also stated that antibiotics given as feed additives increase growth performance and control of diseases in broilers. Gunal et al., (2006) observed that antibiotics given to broilers chickens have no such significant effect on their weight gain. This may be due to the depression and catabolism of muscle protein to fuel this response. Mountzouris et al., (2007) stated that probiotic has a positive effect on the feed conversion ratio of broiler chickens.

The study conducted by Hajati and Rezaei, (2010) stated that probiotics improves feed conversion and growth rate in broilers. Dhama and Singh, (2010) observed that addition of probiotics in the diets of broilers improves body weighy gain, feed conversion ratio and also inhibits growth of pathogenic microbes. Similarly LutfulKabir, (2009) studied the role of probiotics in poultry industry and stated, that is shows better effect on the growth performance of broilers chicken. Jadhav et al., (2015) studied the effect of probiotic on broilers chickens, they stated that it improve growth rate and feed conversion efficiency.

The study conducted by Ghadban, (2002) also stated that using probiotics in diets of broilers increase their growth performance. Taheri et al., (2010) stated that probiotic increases body weight and feed conversion ratio in broiler. Samanta and Biswas, (1997) reported that supplementing the diets of broilers with Lactobacillus species increased their body weight. Mohan (1991) also reported that feeding broilers with probiotics improves growth rate.

The study conducted by Katoch et al., (1996) also stated that adding probiotics in the feeds of broilers increases their body weight gain. According to Chitra et al., (2004) addition of probiotics in the feeds of broilers improves their body weight. Gupta et al., (2004) also reported that supplementing broilers with probiotics increase their body weight gain.

The study conducted by Anjum et al., (2005) stated that supplementing broilers with multi strain probiotic protexin increase their body weight gain. Cavazzoni et al., (1993) observed improved feed conversion efficiency in broilers supplemented with probiotic. Panada et al., (2000) observed that probiotics improves weight gain, feed conversion, immune system and intestinal health of the broilers chickens. Bitterncourt et al., (2011) also studied the effect of probiotics and reported that probiotics increase the feed conversion efficiency in broilers.

The study conducted by Gohain and Sapcota, (1998) also stated that probiotics improves feed conversion ratio in broilers. Haddadin et al., (2001) observed that probiotics used in poultry feed improve broiler growth performance. Gupta, (2004) also reported that supplementation of broilers with probiotics improves feed conversion ratio. The study conducted by Anjum et al., (2005) also stated that probiotics improves feed conversion ratio in broilers. Ahmad, (2004) also observed that protexin used as probiotic increases growth performance and weight gain in broilers. Kabir et al., (2009) found that protexin probiotic increases the weight gain and broiler performance.

Study conducted by Lan et al., (2003) stated, that addition of probiotic in the diets of broilers increases their weight gain. Bansal et al., (2011) also reported that addition of probiotics in the diets of broilers increases their growth performance and feed conversion efficiency. Khan et al., (1992) also studied the effect of probiotics on the body weight gain in broilers chickens, and they observed no increase in body weight gain. That may be due to the fact that when adverse internal conditions prevail in the internal environment which then effects the normal flora of the gastro intestinal tract and pathogenic microbes proliferate which then leads to decrease in body weight.

The study conducted by Arsalan et al., (2004) stated that probiotics has no significant effect on the growth of broilers. This may be due to the fact that healthy and well-nourished chickens do not respond positively to growth promoters. Ali, (2003) studied the combine effect of probiotics and antibiotics on the growth rate of broilers chickens, and found that they improves the body weight of broilers. The study conducted by Mohan et al., (1996) stated that, supplementing broilers with a combination of probiotic and antibiotic improves their body weight gain.

The study conducted by Kahraman et al., (2000) stated that antibiotics and probiotics have no positive effect on broiler performance. This may be due to the fact that addition of antibiotic and probiotic to broilers diet under good hygienic condition does not influence their performance. Loddi et al., (2000) observed that when antibiotics and probiotics are given in combination to broilers it improves their body weight gain, feed conversion ratio, intestinal health and immune system.

REFERENCES

1 Aarestrup, F. M. (1995). Occurrence of glycopeptide resistance among Enterococcus faecium isolates from conventional and ecological poultry farms. Microbial Drug Resistance, 1(3), 255-257.

2 Abdel-Azeem, F. (2002). Digeston, neomycin and yeast supplementation in broiler diets under Egyptian summer conditions. Egypt Poult. Sci, 22, 235-257.

3 Ahmad, I. (2004). Effect of probiotic (Protexin) on the growth of broilers with special reference to the small intestinal crypt cells proliferation. Master of Philosophy Thesis. Centre of Biotechnology, University of Peshawar.

4 Ahmed, A., Khan, T. A., Kanwal, B., Raza, Y., Akram, M., Rehmani, S. F., . . . Kazmi, S. U. (2009). Molecular identification of agents causing respiratory infections in chickens from southern region of Pakistan from October 2007 to February 2008. Int. J. Agric. Biol, 11(3), 325-328.

5 Ahmed, F. E. (2003). Genetically modified probiotics in foods. Trends in biotechnology, 21(11), 491-497.

6 Alam, S., & Khan, M. (2000). Poultry farming in Pakistan. Industry and Economy Magazine. 7th August.

7 Ali, S. (2000). Productivity Growth in Pakistan's Agriculture 1960–1996. A Ph. D. Thesis, Department of Economics, Simon Fraser University, Burnaby, B. C., Canada.

8 Ali, M. (2003). Effect of Different Growth promoter {spirulina} on Performance of Broiler. MAFSU, Nagpur.

9 Alkhalf, A., Alhaj, M., & Al-Homidan, I. (2010). Influence of probiotic supplementation on immune response of broiler chicks. Egyptian Poultry Science, 30, 271-280.

10 Anadón, A., Martínez-Larrañaga, M. R., & Martínez, M. A. (2006). Probiotics for animal nutrition in the European Union. Regulation and safety assessment. Regulatory toxicology and pharmacology, 45(1), 91-95.

11 Ananda Kumar, K., & Lakshminarayan, N. (1997). Probiotics: Importance in poultry production. POULTRY ADVISER, 30, 7-12.

12 Anjum, M., Khan, A., Azim, A., & Afzal, M. (2005). Effect of dietary supplementation of multi-strain probiotic on broiler growth performance. Pak. Vet. J, 25(1), 25-29.

13 Apajalahti, J., Kettunen, A., & Graham, H. (2004). Characteristics of the gastrointestinal microbial communities, with special reference to the chicken. World's Poultry Science Journal, 60(2), 223-232.

14 Arslan, C. (2004). Effect of dietary probiotic supplementation on growth performance in the rock partridge (Alectoris graeca). Turkish Journal of Veterinary and Animal Sciences, 28(5), 887-891.

15 Arslan, M., Ozcan, M., Matur, E., Cotelioglu, U., & Ergul, E. (2004). THE EFFECTS OF PROBIOTIC ON LEPTIN LEVEL, BODY, LIVER AND ABDOMINAL FAT WEIGHTS DURING. Indian Vet. J, 81, 416-420.

16 Awad, W., Ghareeb, K., Abdel-Raheem, S., & Böhm, J. (2009). Effects of dietary inclusion of probiotic and synbiotic on growth performance, organ weights, and intestinal histomorphology of broiler chickens. Poultry science, 88(1), 49-56.

17 Babiker, M., Kijora, C., Abbas, S., & Danier, J. (2009). Nutrient composition of main poultry feed ingredients used in Sudan and their variations from local standard tables values. International Journal of Poultry Science, 8(4), 355-358.

18 Bai, A.-P., Ouyang, Q., Zhang, W., Wang, C.-H., & Li, S.-F. (2004). Probiotics inhibit TNF-α-induced interleukin-8 secretion of HT29 cells. World journal of gastroenterology, 10(3), 455.

19 Balevi, T., Ucan, U., Coşun, B., Kurtoğu, V., & Cetingül, I. (2001). Effect of dietary probiotic on performance and humoral immune response in layer hens. British poultry science, 42(4), 456-461.

20 Bansal, G., Singh, V., & Sachan, N. (2011). Effect of probiotic supplementation on the performance of broilers. Asian J. Anim. Sci, 5, 277-284.

21 Bar-Shira, E., & Friedman, A. (2006). Development and adaptations of innate immunity in the gastrointestinal tract of the newly hatched chick. Developmental & Comparative Immunology, 30(10), 930-941.

22 Barnes, E. M., Mead, G., Barnuml, D., & Harry, E. (1972). The intestinal flora of the chicken in the period 2 to 6 weeks of age, with particular reference to the anaerobic bacteria. British poultry science, 13(3), 311-326.

23 Bedford, M. (2000). Removal of antibiotic growth promoters from poultry diets: implications and strategies to minimise subsequent problems. World's Poultry Science Journal, 56(4), 347-365.

24 Bengmark, S. (1998). Ecological control of the gastrointestinal tract. The role of probiotic flora. Gut, 42(1), 2-7.

25 Bengmark, S. (2002). Gut microbial ecology in critical illness: is there a role for prebiotics, probiotics, and synbiotics? Current Opinion in Critical Care, 8(2), 145-151.

26 Bitterncourt, L. C., Silva, C. C. d., Garcia, P. D. S. R., Donato, D. C. Z., Albuquerque, R. d., & Araújo, L. F. (2011). Influence of a probiotic on broiler performance. Revista Brasileira de Zootecnia, 40(12), 2739-2743.

27 Boirivant, M., & Strober, W. (2007). The mechanism of action of probiotics. Current opinion in gastroenterology, 23(6), 679-692.

28 Bomba, A., Nemcova, R., Gancarcikova, S., Herich, R., Guba, P., & Mudronova, D. (2002). Improvement of the probiotic effect of micro-organisms by their combination with maltodextrins, fructo-oligosaccharides and polyunsaturated fatty acids. British Journal of Nutrition, 88(S1), S95-S99.

29 Bouzaine, T., Dauphin, R. D., Thonart, P., Urdaci, M., & Hamdi, M. (2005). Adherence and colonization properties of Lactobacillus rhamnosus TB1, a broiler chicken isolate. Letters in applied microbiology, 40(5), 391-396.

30 Brashears, M., Galyean, M., Loneragan, G., Mann, J., & Killinger-Mann, K. (2003). Prevalence of Escherichia coli O157: H7 and performance by beef feedlot cattle given Lactobacillus direct-fed microbials. Journal of food protection, 66(5), 748-754.

31 Bywater, R. (2005). Identification and surveillance of antimicrobial resistance dissemination in animal production. Poultry science, 84(4), 644-648.