REVIEW OF LITERATURE
CHAPTER-II

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Due to rapid urbanization and industrialization the demand for meat, particularly tender chicken meat i.e. broiler is rapidly increasing day by day. The cost of feeding in poultry production alone accounts for 60 to 70 per cent of the total Farm expenditure.

A large number of growth promoting agents and herbal products are occasionally used in poultry feed and drinking water to produce higher live weight gain by feeding considerably less amount of feed.

Therefore with this silver lining in view, an effort has been made here to review and illustrate the retrospective study so far encountered on the useful utilization of different herbal liver stimulants as growth promoters in the field of poultry nutrition.

A number of indigenous herbs and proprietary preparations have been claimed to be effective in liver disorders in poultry and animals which includes Liv-52, Livol, Tefroli, Livergen, Livo-Vet, Hepagest liquid Liv fit-Vet, Linto-powder, Vet Liv, Geriforte, Nitrovin, Virginiamycin, Flavomycin, Shatavari and Ashwagandha etc.

*Kritikar and Basu (1933)* studied the action of *Solanum nigrum*, constituent of Livol and Liv-52 and found root bark of this plant being used as laxative, reduced the inflammation of the liver. The juice of this root in doses of 6-8 ounces was given in the
treatment of Chronic hepatic enlargement, was found as valuable alternative.

Gyrogy (1944) advocated methionine 2-4 g, cystine or choline 2-4 g, balanced B-complex, protein rich and fat restricted diet for the treatment of experimental hepatopathy in animals and birds.

Chopra et al. (1956) reported that Solanum nigrum and Terminalia arjuna have no curative and prophylatic action against varied liver disorders. Extract of Solanum nigrum cured chronic inflammation of liver and dysentry, whereas bark of Terminalia arjuna was used as tonic and antidote for poisons. The fruit was used as general tonic.

Damele and Deshpande (1966) reported that Liv-52 increased the body weight in several species of animals including the human beings and also had tonic effect on the respiratory, digestive and cardiovascular systems.

Kadvekar and Murkibhavi (1971) reported that Vitamin B-Complex and liver extract were found helpful in the treatment of anorexia associated with liver dysfunction.

Prasad (1974) reported that probably Liv-52 stimulated the mitotic activity of liver cell and so stimulate the liver cells to regenerate.

Ramappa et al. (1975) reported that the gain in body weight of broiler chicks at 10-weeks age for Liv-52 powder fed group, Liv-52 drops fed group and control group was 716.7 g, 732.5 g and 621.6g, respectively. The feed consumption during the same period for the three groups were 2375 g, 2500g and 2300g, respectively. The Liv-52
powder and Liv-52 drops fed groups of chickens, respectively gained 95.1 g and 111.9 g more body weight than the control group while consuming 75 g and 200 g more feed respectively. The Liv 52 drops fed group gained 16.8 g body weight more than the Liv 52 powder fed group which consumed 125 g more feed. The gain in body weight of Liv-52 drops and powder fed groups was significant, compared with the control group.

Mohan et al. (1978), in their experiment found that the mortality per cent of 4 strain of white leghorn during 0 to 8 weeks of age were 8.12, 10.30, 8.53 and 8.84 in the strain A, B, C and D, respectively.

Saxena and Garg (1979) reported that Liv 52 contained Solanum nigrum, a herb, which increased protein level in liver.

Roiter (1979) observed mortality at 0 to 8 and 9-12 weeks of age were 9% and 4%, respectively.

Rao and Sreemannoyana (1980) administered Geriforte to cockrels at the dose rate 6 g/50 kg of ration and reported a significant body weight gain of treated cockrels.

Singh et al. (1981) reported that Ocimum sanctum leaves have anti-stress, adaptogenic and performance enhancing action. It also stimulates the liver function.

Prasad and Singh (1982) reported that the significant improvement in weight gain and feed efficiency in broilers when Liv 52 powder was supplemented in feed at various levels.
Singh (1981) and Singh et al. (1982) assessed the antistress (adaptogenic) activity of Withania somnifera (Ashwagandha) in experimental modal of stress. This drug increases physical endurance, protects animal from stressulcers and carbon tetrachloride induced hepatic toxicity. These results supported the hypothesis of tonics and vitalizers of Ayurveda and recommended clinical use of Withonine in the prevention and treatment of many stress diseases, like arteriosclerosis, premature ageing, arthritis, diabetes, hypertension and malignancy.

Feeding of several herbal medicines have been reported in domesticated animals for increase in growth rate and in various hepatic disease (Srinivasan and Balwani, 1964; Captain and Syed, 1966; Sinha et al., 1975; Sud, 1982; Verma and Husain, 1984) Liv Fit Vet Premix, a herbal proprietary product of M/S Dabour Ayurved Limited, Ghaziabad, marketed as liver tonic for poultry is claimed as a useful growth promotor for the broilers due to its general tonic properties.

Shridharan et al. (1984) studied the effect of H. spinosa, A. paniculata herbs and Liv 52 in experimentally induced liver damage with carbon tetrachloride in dog. The effects were assessed by estimating SGPT, SGOT and serum alkaline phosphatase activity. The group treated with herbs and Liv 52 showed low levels of enzyme activity and possessed necrotropic properties.

Narendranath et al. (1985) induced hepatotoxicity in albinorats with CTC and D-galactosamine hydrochloride and treated these rats with Tefroli tablets and syrup. With bio-chemical and
histopathological studied, they concluded that, Tefroli was a very effective drug in correcting hepatic disorders.

Sanchez et al. (1985) analysed the data of 3522 fowls, for females reared in mixed or single sex group. The body weight at 56 days of age averaged 1460.03 and 1464.03 gms respectively Vs 1780.14 and 1809.20 grams for males. The difference between male and female being significant. There were no significant difference between groups in feed conversion, mortality, chest girth or thigh length, but males reared in single sex group had a significantly greater chest depth (P<0.01) than two females one male reared mixed groups.

Danga et al. (1986) studied the effect of Arogya vardhini againsted the carbon-tetrachloride induced hepatic disorders in albino rats. From that study they concluded that pretreatment with Arogya Vardhini was effective to protect the Liver against CTC induced acute hepatic damage.

Joshi et al. (1987) reported that Liv 52 accelerated the growth rate in terms of gain in body weight and that the optimal dose of this drug for quails for accelerating in growth 150.5 g/kg of feed. At this dose level, it significantly increased the R.B.C., haemoglobin, PC.V. and protein with significant decrease in blood cholesterol level.

Mujeer et al. (1988) supplemented Brotone at various levels in drinking water and found improved weight gain and profit margin with better feed efficiency in broilers.

Reddy and Rao (1988) reported that acid treatment of decorticated Neem Cake and acid plus alkali treatment of all Neem
Cake improved growth and achieved a significant weight gain and feed efficiency of broilers.

Babu *et al.* (1988) observed that inclusion of Tefroli at a level of 1 per cent in the broiler feed helped in growth promotion. A trial was conducted with Tefroli in broiler feed at 0.1 and 2 per cent levels. No significant difference was observed in eight week body weight of broilers. However, 1 and 2 per cent Tefroli supplementation had registered 1110.8 and 1085.1 g as against 1074.3 g of control group. Significantly difference in feed consumption was recorded, but not for feed efficiency.

Mishra *et al.* (1989) reported that the active chemical derivatives of Ashwagandha root was an alkaloid which varied from 0.21 to 0.44 per cent, the major alkaloid is withanin, in addition to this other alkaloids and chemical compounds are also present such as somniferine, sominine, withanine, glycosides, starch, sugars and amino acids.

Devegowda *et al.* (1990) used Livol (product of m/s Indian herbs Ltd., India) in broiler diets at three levels 0.0%, 0.25% and 0.5%. The body weight and feed efficiency of the Livol supplemented groups were significantly superior to the control group.

Sapra *et al.* (1990) reported that one week old commercial broilers were fed with livol or CHO-60 in the ration at the recommended doses through eight weeks of age as growth promoters. It is concluded livol fed birds having higher livability, may give higher return because of higher total available meat from the dressed birds.
Dasture (1990) reported that *Azadiracta indica* is a well-known medicinal plant of the family aliaceae. The leaves of Neem are carminative expectorant, anthelmintic, antidotal, antilithic, diuretic, emmenagogic, discutient and insecticidal in use. The fresh juice with salt is given for intestinal worms and with honey the juice is prescribed for jaundice. An infusion or decoction of fresh leaves is a bitter, herbal tonic and alternative, specially in chronic malarial fever, because of its action on liver, it is given in one to half ounce doses.

Chaudhary (1991) noticed that the drug Livol was efficacious in treating of aflatoxicosis in both layers and broilers at the dose rate of 2.5 ml/lit of water daily for 5 days. Livol improved egg production performance in layer and weight gain in broiler.

Mishra (1991) reported that Livol liquid has the capacity to counteract the damaging effects of aflatoxin in feed and allows optimum body weight gain, FCR and survival in broiler chicks.

Panda (1991) recorded that there was some improvement in the body weight gain of Livol treated birds with less damage to the Liver when compared to aflatoxin fed controls. He concluded that Livol treatment has some beneficial effect on hepatic damage caused by high levels of aflatoxin in poultry feed.

Dhande *et al.* (1991) reported that inclusion of Livol at a level of 0.5 per cent in broiler ration, helped in body weight gain by 15 to 23 per cent, economical and profitable return to broiler industry.

Prasad and Chakrovorty (1991) observed that birds raised with Neem leaves extract in drinking water found to be most economical
in terms of better growth rate, improve weight gains, with higher feed conversion efficiency.

Kumar et al (1991) reported that feeding Livol @ 0.50 per cent improves significantly the overall performance of broilers in term of increased weight gain leading to substantial profit.

Jadhav et al. (1991) noticed that Polmix L (clomiphene citrate) when used as poultry feed additives at the level of 20 gm/qt has been claimed to improve egg number and feed efficiency.

Kumar and Singh (1992) studied the effect of three different Ayurvedic Liver stimulant on the performance of broiler out of these, Liv-52 was found to be the best growth promoters and economical in comparison to others. Therefore, Liv-52 may be used in broilers drinking water for increased profit.

Ghosh (1992) reported that supplementation of Livron was beneficial for over all performance of broilers. A test was conducted with 108 day old broiler chicks of as commercial strain in electrically heated and thermostatically controlled brooder for a period of six weeks. The birds were fed ad lib with broiler starter and broiler finisher ration. One group of birds was kept as control and the remaining were offered Livron @ 0.1, 0.25 and 0.5 per cent in the feed respectively, which indicated the highest body weight gain and feed conversion in the group fed feed mixed with Livron @ 0.5 per cent.

Ibrahim et al. (1992) reported that Brown Hisex chicks were fed diets containing 2% and 5% Azadirachta indica leaf from their 7th to 35th day of age. Therefore, the chicks were fed control diets for 2 weeks. A depression in body weight gain and efficiency of feed
utilization was observed in chicks fed *Azadirachta indica* leaf when compared with the control. The main clinicopathological changes were increased in lactic dehydrogenase, glutamic oxaloacetic transminase (GOT) (aspartate aminotransferase) and alkaline phosphatase activities, uric acid and bilirubin concentrations and decrease in the total protein level in serum. Changes in the value of erythrocyte count, haemoglobin concentration, packed cell volume (PCV) were also noticed.

Petukhova *et al* (1992) reported that the feed yeasts 1.5 or Gaprin (methane acidifying bacteria cultured on natural (gas) 1.0 or 2.0%, added to a complete feed mixture given to chickens, slightly depressed digestibility of DM, organic matter, protein and nitrogen extract, EE at 9 and 16 weeks old but increased that of fat, at 9 weeks old.

Patil and Mallikarjunappa (1992) studied the efficiency of Livol as feed additive on egg production of White leghorn layers. By feeding livol @ 0.5 gm/bird/day the egg production increased from 70.93% the 74.10%. By considering the cost of the extra egg produced the extra income obtained was 23 paise/bird/month.

Takalikar *et al.* (1992) reported that on experiment was conducted to study the effect of probiotic (Lactobacillus spores powder) in broiler production. The broiler chicks (72) reared or. the diet supplemented with 0.02% probiotic grew faster than control up to 6 weeks age followed by significantly (P <0.05) slower growth rate at 8 weeks of age. The broilers receiving probiotic consumed less feed as compared to control. FCR was similar in broilers receiving probiotic and control. Lower protein balance with higher retention
was observed in probiotic fed group than the control. However, the energy balance and its retention was lower in probiotic fed group as compared to control. Calcium and phosphorus balance were almost similar but their retention was higher in probiotic fed group than control.

Pradhan and Basu (1993) studied the effect of proprietary Liver tonic, Vet Liv of M/S Vetmed, was evaluated on three groups of experimental broiler birds comprising 20 in each of both the sexes and receiving Vet Liv @ 0.20 g (Gr. B), 0.35 g (Gr. C) and 0.5 g (Gr. D)/bird/day from 6th day onwards and compared with control group (Gr. A 20 nos.). During for a period of 49 days, addition of Vet Liv showed a significant improvement of the weight gain and feed efficiency in Gr. C and Gr. D experimentally birds and also a moderate improvement in Gr. B and thus showed its beneficial effects on the performance of broiler chickens.

Prasad and Sen (1993) reported that the broiler chicks may be raised relatively cheaper with the feed mixed with 0.5 per cent Livol.

Singh et al. (1993) reported that shatawari additive given @ 0.75 in the layers feed proved more profitable than other additives which however better than control diet. Forty WLH layer (280 d) of identical physiological attributes were divided in to 4 groups of 10 each and maintained under deep litter system while the control, T1 group was offered a standard layer ration, the treatment groups were fed layer mash alongwith 0.50 (T2) 0.75 (T3) and 1.00 (T4) per cent Shatawari as an additive. Studies carried out over a period of 28 days revealed a significant (P <0.01) increase in egg production, daily, weekly and cumulative, feed conversion efficiency per dozen
and per Kg egg weight and number of graffian follicles. A declining trend in feed intake in relation to increasing levels of additive was observed.

Babu and Gajendran (1993) conducted feeding trial in Japanese quails to assess the influence of probiotics or antibiotics or liver tonics on production performance and hatchability. Feeding probiotics and/or antibiotics or liver tonic significantly improved egg production from 7 to 26 weeks of age. However, feeding Virginiamycin or livol improved feed efficiency, production performance and hatchability in laying quails.

Mudalgi et al. (1993) examined the effect of feeding two probiotic cultures (Lactobacillus acidophilus and L. bulgaricus) on the performance of broiler chicks. Each of the two cultures were grown on skim milk and dispensed through the drinking water (10 g/l) to group of chicks fed ad lib diet containing 20 or 21.8% crude protein from day-old to 42 days of age. A set of birds with no added probiotics served as the control. The results revealed no significant treatment effects on growth, feed intake and feed conversion efficiency, although the birds offered probiotic cultures appeared to gain numerically higher weights than those fed the control diets irrespective of the protein level. Chicks fed L. bulgaricus with low and high protein diet gained 5.7% and 6.5% more weight, respectively over the control birds. Also no significant treatment effects on the utilization of dietary nutrients by chicks were observed.

Sreenivas and Devegowda (1994) reported that the influence of virginiamycin with two levels each of energy and protein in starter
diet (2700, 2800 ME Kcl/kg and 22, 23% protein) as well as in finisher diet (2750, 2850 ME Kcl/kg) and 20, 21% protein) was studied from day old to 42 days of age. Dietary supplementation of virginiamycin at different levels of energy and protein significantly (P <0.05) improved body weight and feed efficiency as compared to unsupplemented groups.

Baidya et al. (1994) conducted an experiment to study the effect of feeding antibiotic and probiotic either singly or in combination as well as phase feeding or alternate use of the same in the ration of broiler up to 6 weeks of age. Body weight gain, feed intake, feed efficiency ratio, carcass (giblets) and haematological parameters (PCV, Hb, SGOT, SGPT and ESR) did not differ significantly among different treatments.

Mandal et al. (1994) reported that the use of different growth promoters viz., (i) Aurofac-100 (ii) Neftin 50 (iii) Vetradox (iv) Flavomycin-40 (v) Stofac-20 (vi) Raxarsone (vii) Bioboost-40 (viii) and T.M. 50 (ix) on the performance of broilers reared for 8 weeks, showed the highest body weight gain in group VI followed by group V, IX and VII. Feed efficiency ratio and eviscerated carcass yield did not differ significantly among the various treatment groups. Haematological parameters studied also did not vary among the treatment groups.

Pandey (1994) reported that root powder of Withania somnifera, a well known Indian drug could be used as tonic, sedative and in many other diseases. Withania roots are also used in Leucorrhaea, rheumatoid arthritis and as anti inflammatory for joints and certain paralytic conditions. It is prescribed for all kinds of
weakness and is supposed to promote strength and vigour being regarded as an aphrodisiac and rejuvenator, several drugs prepared by this are also used in all kinds of nervous disorders and as relatives in the treatments of insanity and hypertension.

Tomar et al. (1995) reported that addition of Liv fit in diet of broiler has beneficial effect to some extent on body weight gain, feed consumption and feed conversion efficiency. Blood biochemical parameters are the major components of the internal environment and important for drawing any conclusion about the effect of stress on the bird.

Verma et al. (1995) studied that the effect of feeding Liv-52 powder on egg quality and some blood characteristics in White leghorn birds. For this study eight laying birds of about 8 months age were randomly divided into two groups. First group of birds were fed Liv-52 powder in the feed at the rate of 1 g/kg feed, but the second group without Liv-52 powder. These birds were housed in individual laying cages and kept under standard management and environment conditions.

The internal and external egg quality measurements in both the groups were analysed. In Liv-52 fed group egg weight and Yolk index were significantly higher (P<0.01) than control group. Albumen weight and index was not effected due to treatment. Shell weight and shell thickness were significantly higher (P <0.01) in Liv 52 fed group. Liv-52 feeding increase the haemoglobin and total serum protein concentration in blood. The values of cholesterol content (mg/100 ml) in egg yolk were 19.44 ± 0.84 and 17.33 ± 0.92 in group I and II, respectively.
Biological traits of herbal formulations used as growth promoters have established beyond doubt improved overall performance with respect to weight gain, feed efficiency, lowered mortality and also as therapeutic against liver damage due to feed contaminants like oflatoxins, toxicity caused by chemical drugs and in improving digestion (Romappa et al. 1975; Rao and Reddy, 1986; Devegowda et al., 1990; Devegowda and Aravind (1996).

Mujeeb (1996) A trial was conducted to determine the immunomodulating action of Stresroak (A Herbal formulation of Dabur Ayurvet Ltd, India). Commercial broiler chicks were divided into two groups I & II at day one of age. Each group consists of 1000 birds. Both the groups were vaccinated with Newcastle disease (N D) live vaccine (F I Strain) on 5th day (intra ocular) and Lasota Vaccine in drinking water on 28th day. Stresroak was administrated to group I@ 5ml per 100 birds from age day 1 to 28 then @ 10ml per 100 birds from age day 29 to 49. Group II were kept as untreated control. The antibody titres were determined on day 12, 26, 35 and 49. The immune response was highly significant in Stresroak treated group besides its significant improvement in bodyweights, feed conversion ratio, livability performance efficiency factor and highly favourable cost economics in broiler production.

Younus (1996) A trial was conducted on 50,000 commercial layer pullets distributed at seven commercial farms under various management controls. Each flock was divided in to 3 groups viz. C, T1 & T2 "C" control group was kept without medication. T1 was given Stresroak (A herbal formulation of dabur ayurvet limited, India) from day 1@ 5ml per 100 chicks upto 14th day and then 10ml per 100
birds per day from 15th to 28 days. T2 was given stresroak from the day of I.B.D. Vaccination @ 20 ml per 100 birds per day for 14 days. Antibody titres were estimated by ELISA on day 0, 7, 14, 21, 28 and 38. Group T1 showed significantly higher litres to both "C" & T2 group. T2 litres were significantly higher to control group. The livability and feed conversion was also better in treated groups.

In a recent study Devegowda and Aravind (1996) used Liv fit (Product of M/S Dabur Ayurved Ltd. India) in broiler diets and reported the beneficial effects with reduced mortality accompanied by significant improvement in body weight and feed efficiency. However, the benefits in immunomodulation and liver enzymes profile were marginal. The results corroborate the findings of Narabhari (1995), where significant improvements were recorded in body weights, feed efficiency and livability in broilers feed diets supplemented with 0.2 per cent Liv fit.

Several herbs were used as a medicine and growth promoter in poultry as described by Devegowda (1996) given below:

1. *Achyranthers aspera* (*Prickly chaff flower)*:

   The flowers contain alkaloid and saponins with astringent property and is use mainly for respiratory disorders.

2. *Boerhavia diffusa* (*Spreading Hogweed)*:

   The active ingredients present in this plants are alkaloids, myristic and oxalic acids which reduce S-GPT and S-GOT levels, increase liver ATPase activity and is the drug of choice for Joundice and Ascites. Besides, the plant also has stomachic, spasmolytic, anti-inflammatory and antiviral properties.
3. *Solanum nigrum* (Black nightshade):

The plant extracts consist of alkaloids, glycosides and fatty acids which exhibit both, hepatoprotective as well as antihepatotoxictic properties.

4. *Eclipta alba* (Bhringaraj):

It is considered the best Ayurvedic herbs for the treatments of liver cirrhosis and effective hepatitis. Trials have shown a cytoprotective effect for the hepatocytes against phallidin which is the strongest known hapatotoxin. This antihepatotoxictic effect is attributed to apigenin and wedelolactone which are the main phytochemical constitutes.

5. *Ocimum sanctum* (Tulsi):

Its main property is as an immunomodulator and acts at various levels in the immune mechanism by increasing Ig E antibody titre level, release of mediators of hypersensitivity reactions. It is also a very effective antistress medicine especially to counteract stress related to gastric ulcers and hypertension.

Prajapati (1997) conducted a field trial on commercial broilers, fed an Liv fit vet premix at the rate of 2 kg/tonnes from 1-42 days age resulted in improved livability, weight gain and FCR, compared to untreated controls. Cost benefit analysis revealed net additional gain of Rs. 1.84 per bird attributable to the supplementation.

Mishra (1997) reported that supplementation of Ashwagandha root powder in the feed of broiler chicken at the rate of 0.5%, 1% and 2% in group I, II and III, respectively. They found that the feed
conversion efficiency and body weight gain was better in Ashwagandha fed groups as compared to control group in broilers chicken. The highest mortality percentage were noticed in control group as compared to treatment groups.

Yadav (1997) fed provide the Liv fit Vet premix in White leghorn birds at the rate of 0.1, 0.1, 0.2 and 0.3 per cent in feed in group I, II, III and IV, respectively. It was found that the feed consumption, feed efficiency, digestibility of DM, OM, CP, EE and carbohydrate, N, Ca and P balance, egg weight, egg length, shape index, Yolk index, albumen weight, Yolk weight, albumen index, haugh unit score serum protein, haemoglobin, PCV, RBC, serum glucose, cholesterol, TLC, DLC alkaline and acid phosphatase, SGOT, SGPT, weight of body, heart, liver, lung, kidney and hatchability percentage were highly significant.

Verma (1997) conducted a field trial on White plymouth rock birds, head on liv fit vet premix at the rate of 0.1, 0.2 and 0.3 per cent in group II, III and IV, respectively. They observed that the feed consumption, body weight of first egg laid, digestibility of dry matter, crude protein, ether-extract, carbohydrate, organic matter, calcium balance yolk index, haematocrit value, PCV, TLC, DLC, RBC, WBC, total serum protein, cholesterol, glucose, serum calcium, serum phosphorus, SGPT, SGOT, alkaline phosphatase, acid phosphatase, hatchability percentage, weight of heart, liver, lung, kidney was significant in various groups of birds But age at first egg laid, N and P balance, egg weight, egg length, egg girth, shell thickness, shell weight, viteline membrane thickness, shape index, Yolk weight, albumen weight, albumen index, haugh unit score, haemoglobin were non significant.