

## Efficacy & Significance of LYSO HERB Herbal Lysine in the nutrition, metabolism and health in Poultry

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## Efficacy and significance of the phytogetic METHO ADD Herbal Methionine as replacer of Synthetic DL- Methionine in nutrition and health of Poultry

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### ABSTRACT

In poultry industry, amino acids are supplied along with vitamins and minerals since these play a pivotal role as protein building units which are the essentialities of growth and metabolism. Of the 9 essential amino acids Methionine is the first limiting one followed by Lysine, these cannot be synthesized by animals hence to be obtained from external sources majorly the feed.

Amino acids act as intermediates in all the metabolic and physiological functions of the bird like calcium absorption, production of collagen, antibodies, hormones, enzymes. Their deficiency causes de-pigmentation, reduced hemoglobin, poor FCR, reduced production, retarded growth, poor feathering and egg production, immune suppression and increased disease incidence. Cells in the body are constantly being broken down and restored, so the body needs these amino acids to produce new hormones and restore the body.

Of late the use of synthetic Lysine and Methionine as supplement has increased due to high demand of meat. The safety of these is questionable due to higher pricing, emergence of drug resistance, residual toxicity and other side effects. Therefore, a renewed interest in developing natural alternatives to maintain production, performance and health in poultry, hence Phytogetic herbals are considered the best option..

The results obtained here provide clear evidence of the potential of Phytogetic Herbal Lysine as Lyso Herb and Herbal Methionine as Metho Add as substitute of synthetic Lysine & Methionine with unaltered activity throughout, without reducing growth performance, increasing fat accretion and changing serum biochemical characteristics, with better performance and economics.

**Key Words:** Amino acids; L-Lysine; Methionine; Phytogetic; Poultry; Synthetic lysine.

### 1 INTRODUCTION

In poultry feed industry, amino acids are commonly supplied along with vitamin and minerals. Amino acids play a pivotal role as protein building units. The 9 essential amino-acids viz. histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine along with other non-essential ones. Amino acids act as intermediates in the metabolism process and are essential for physiological functions of the body. Growth and repair of damaged cells is governed by the presence of histidine, but it is not synthesized in the body.

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Lysine is recognized as a limiting amino acid vital functions of the body, it assists in absorption of calcium, production of antibodies, hormones, enzymes, reduces reactive oxygen and herpes viral growth. Lysine deficiency causes de-pigmentation and reduced haemoglobin in animals. Lysine is used by the body to create collagen, the main structural protein of the tissues. Cells in the body are constantly being broken down and restored, so the body needs amino acids like lysine to produce new hormones and restore the body. Protein hormones stabilize the basic functions of the body and metabolism. These protein hormones are composed of thousands of amino acid chains.

Of late the use of synthetic Lysine as supplement has increased due to high demand of meat, but the higher pricing of the synthetic Lysine increased the costing of the finished product. Not only is the safety of these synthetic additions become questionable but also due to the emergence of drug resistance, residual toxicity and other side effects.

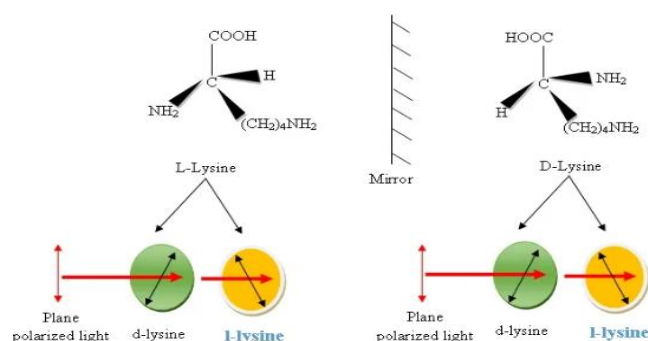
Therefore, there is a renewed interest in developing natural alternative for the synthetic Lysine in order to maintain production, performance and health of the poultry hence herbal extracts are considered to play the role of supporting both performance and health status of the poultry.

## 2 WHAT IS LYSINE?

Lysine is the amino acid that contains an  $\alpha$ -amino group, an  $\alpha$ -carboxylic acid group and a side-chain lysyl classifying it as a charged aliphatic amino acid.

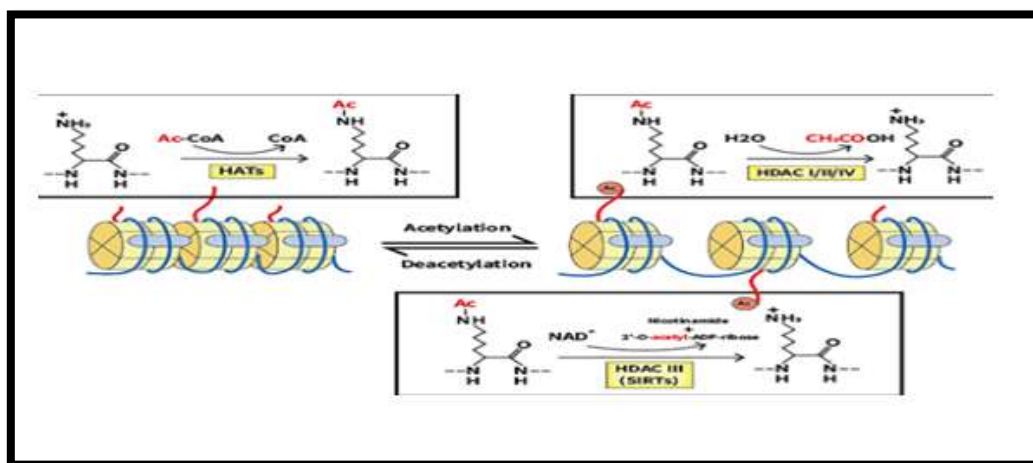
It is an essential and limiting amino acid, means that the body is in capable to synthesize it and thus to be obtained only from the diet. Without this amino acid, animals cannot absorb calcium or make any collagen, nor can create any type of antibodies, enzymes or hormones, since it is considered to be the base for the growth of an animal. Adequate dietary supplementation of lysine is essential for optimum carcass quality, meat characteristics egg production, egg quality and egg weight too.

## 3 LYSINE STRUCTURE



The chemical formula of Lysine is  $C_6H_{14}N_2O_2$  with its central carbon attached to a carboxylic acid and an amino group. The specific alpha amino acid with a basic side chain (R-group) commonly found on the surfaces of proteins and enzymes and sometimes appears in the active sites.

#### 4 WORKING



The  $\epsilon$ -amino group acts as a site for hydrogen bonding and a general base in catalysis including methylation of the  $\epsilon$ -amino group. The hydroxylysine that is derived from lysine by the lysyl hydroxylase is the important constituent of Collagen. Some viruses need arginine, to survive and reproduce. L-Lysine supplementation works by tilting the balance towards lysine, reducing viral outbreaks.

#### 4.1 LYSINE USES

Lysine is used for the prevention and treatment of some viral infections and sores. It increases the absorption of calcium and prevents its excretion. Use in managing and preventing painful and unsightly sores caused by the viral attack. Lysine has also been shown to be useful in the prevention of atherosclerosis and osteoporosis. To maintain growth, lean body mass, and the body's store of nitrogen, supports the synthesis of body proteins and the body's natural immune defenses. Role in the production of carnitine, a nutrient responsible for converting fatty acids into energy an important role in the formation of collagen, helps muscle tissue recover after stress.

#### 4.2 NATURAL BIOACTIVE HERBAL ALTERNATIVE FOR SYNTHETIC L-LYSINE

The digestibility and absorption of synthetic lysine is decreased with increased temperature during pelletisation process by about 60%. While plants contain high quantity of lysine and other amino acids in a readily digestible composition that is more stable and temperature resistant.

Herbal Lysine is developed from selected plants with high lysine activity. The Lysine in Herbal Lysine is available as conjugated dipeptide, glycopeptide and other lysine conjugates. The integrity and bio availability of the Herbal Lysine is due to the encapsulation activity of micropores of the phytosomes. Thus, Herbal Lysine provides optimum lysine activity for proper protein accretion and other functions so that animals reach maximum growth and performance potential. Therefore, Herbal Lysine can be more effectively used as compared to synthetic lysine for optimum performance of the bird.

#### 4.3 EFFICIENT HERBAL FORMULATION FOR NATURAL LYSINE

Lysine is developed from selected botanicals with a good lysine activity and contains lysine in conjugated dipeptide, glycopeptides and oligopeptide forms. They have Lysine that is present within the phytosomes in their encapsulated and conjugated form but this natural form further increases the bio availability of lysine. Herbal lysine leads to a marked improvement in feed intake, digestibility of nutrients, better FCR, weight gain. The Phytochemical bioactives present in mimic the activities of L-Lysine and available in readily digestible form.

#### 4.4 PUMPKIN (*Cucurbita pepo*)

Pumpkin (*Cucurbita pepo*) belongs to the family of Cucurbitaceae. All its parts are filled with beneficial nutraceuticals that make it a super food and is hence one of the top plant sources of lysine and also a great source of iron, magnesium, and zinc. A typical 100 g of pumpkin seeds can provide 1.24 – 3.79 g of Lysine based on the varieties of the seed.

#### 4.5 FENUGREEK (*Trigonella graceum*)

Fenugreek (*Trigonella foenum-graecum*) belongs to Fabaceae family and one of the oldest medicinal plants. Fenugreek seeds can be a good supplement of lysine nearly 5.7 g/16 g N

#### 4.6 OREGANO (*Oreganum vulgare*)

Oregano herb that comes under the mint family Lamiaceae All the varieties contain essential oil and the principal components of them are thymol and carvacrol. It is good for the gut,

aiding digestion by increasing the flow of bile. A good source of Lysine @0.500g/100 g of dried Oregano.

#### 4.7 BASIL (*Ocimum basilicum*)

*Ocimum basilicum* L., commonly known as basil or sweet basil, is an annual spicy herb of the Labiatae family often called “King of the herbs” due to its wide range of uses in the pharmaceuticals. Containing Lysine 0.1g/100g of dry Basil powder.

#### 4.8 MUSTARD (*Brassica juncea*)

*Brassica juncea*, belongs to the family Brassicaceae or Cruciferae. Mustard has an excellent nutritional profile being rich in lysine with adequate amounts of sulphur-containing amino acids (methionine & cysteine) which are limiting amino acids. Lysine 1.844 g/100g

#### 4.9 SOYA BEAN (*Glycine max*)

Soybean (*Glycine max*) is a leguminous oilseed and one of the world’s largest and most efficient sources of plant protein belonging to the Fabaceae family. Lysine 8.1% of its Amino acid composition around 6.2 g/16 g N.

Herbal Lysine as a natural derivative from herbals like Pumpkin, Fenugreek, Oregano, Mustard, Basil, Soyabean, contain natural lysine that can be better utilized by the animals in a better way. This is more effective and safer than the synthetic form. Birds fed on this combination of Herbal Lysine showed a significant increase and gain in body weight, this can be attributed to the potential role of Lysine in promoting growth. Improved feed intake and better FCR with optimized egg weight and production. The hatchability, performance, health and livability of the bird enhanced. Optimized protein synthesis and energy utilization, kept bird at a bay from stress and related protein catabolism problems.

This natural Lysine combination seems to optimize protein synthesis and energy utilization of the birds. Improves growth, performance, FCR and livability. Helps in improving calcium absorption from the digestive tract and prevents its loss through excretion. Its role in fat metabolism prevents liver enlargement and fatty liver syndrome. Nullifies Induced Hepatotoxicity, prevents Cholecystitis & Cholangitis. Increased egg production with optimum egg size, maximum breast and thigh yield with good carcass. Feed Inclusion of this natural Lysine is capable to replace synthetic lysine completely with higher and sustained lysine activity. It also seems to play a role in building muscles and enabling to maintain muscle mass. More of this natural Lysine combination showed higher bone mineral density

and collagen formation. Along with proline and glycine, helps in the regeneration of damaged cartilage too.

The observation of serum of animal on this dietary natural lysine addition, showed less muscle wasting, feed intake, body weight gain and FCR significantly better, higher dry matter metabolizability and nitrogen retention for body building protein formation . It also contributed to the synthesis of neurotransmitters serotonin and dopamine.

Lysine isn't a substitute for prescription or medication for any health condition it is the basic need. Results of this natural lysine formulation, substitution demonstrated significant improvement in growth performance and hepato protective action of herbal amino acid supplement N-Lysine. It can very well be concluded that the herbal product N-Lysine from this formulation can successfully replace synthetic Lysine in Poultry. Many of such formulations are in vogue, Lyso herb being one of the better choices. This may be attributed to the efficacy of constituent herbs that are rich sources of herbal lysine and scientifically well proven.

## **5 EFFICACY AND SIGNIFICANCE OF THE PHYTOGENIC METHO ADD HERBAL METHIONINE AS REPLACER OF SYNTHETIC DL- METHIONINE IN NUTRITION AND HEALTH OF POULTRY.**

Proteins are made up of amino acids which are the essentialities of growth and metabolism Amino acids help build the proteins that make up the tissues and organs of the body. Methionine is the most essential amino acid that cannot be synthesized in the body of animals hence to be obtained from external sources majorly the feed.

In Poultry, Methionine mainly has major contribution in the synthesis of body proteins and as a constituent of muscles, feathers and many other internal organs. It also has its role in the synthesis of polyamines a non-protein function. Methionine is a methyl-group donor, it helps in the synthesis of Choline, DNA and Epinephrine mainly. After donation of the methyl group, through the transsulfuration process it forms the Cystine, this is vital for protein synthesis.

Methionine deficiency usually manifests itself via anomalies in the fat metabolism leading to poor FCR, reduced production, retarded growth, and reduced egg weight, along with weakness, poor feathering and immune-suppression with increased disease incidence.

### **5.1 SYNTHETIC METHIONINE**

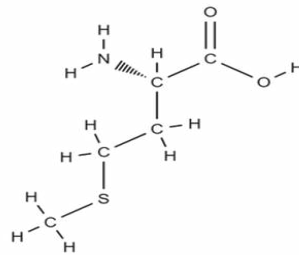
Synthetic Methionine is produced and available as a pure amino acid in 2 forms as DL-Methionine and 2-hydroxy-4 methylthio butanoic acid

## 5.2 NATURAL METHIONINE

Possible and most amicable method from plant phyto chemicals in its most bio available form.

## 5.3 METHIONINE STRUCTURE

**Structure** is basically A central carbon atom, an amino group, the carboxyl group, a variable side chain R.



## 5.4 METHIONINE'S ROLE IN THE ANIMAL

Methionine is an amino acid that is needed for the repair and rebuilding of the damaged tissue in the body and vital role in protein synthesis. Required in the carbohydrate and lipid metabolism and in the production of critical compounds like T and B lymphocytes etc., each of which come with their own set of benefits and functions. It increases the muscle mass, by improving the lipid metabolism and maintaining the muscle – fat ratio.

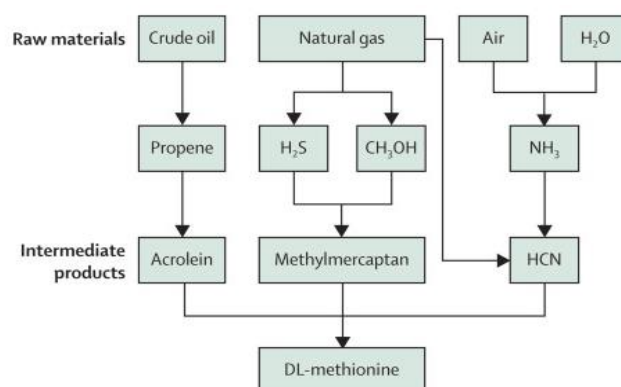
Methionine as an antioxidant, prevents oxidative stress. It is capable of identifying heavy and toxic metals like lead, mercury and eliminate them with the help of the liver activities. It supports the synthesis of the DNA by its methylation capabilities. Prevents oxidative nerve damage and lowers inflammation. Improves bone health, by increasing bone volume and bone mineralization, making the bones denser and stronger. It is very important in the healing of the hepatic cells from fatty liver syndrome and other hepatic issues. It protect the hepatic cells, speeds up the healing process and reduces the recovery period.

A methionine deficiency typically results in poor FCR, retarded growth, reduced egg weight and egg production, impaired immunity etc. Methionine deficiency is characteristic of the bird pulling out its own feathers from its body and attempting to eat them. This results in poor feathering, reduced feather cover on the body, feather pecking, cannibalism and finally mortality. Apart from all these the feed intake suddenly increases reducing the feed efficiency.

### 5.5 DISADVANTAGES OF SYNTHETIC METHIONINE

The use of Synthetic Methionine has considerably reduced the use of additional protein to the animal feeds. It is economically viable and large scale production is possible. It is produced during the petrochemical synthesis through the oxidation of propylene by acrolein, this when combined with methyl mercaptan yielded methionine. This synthetic methionine is in two bioavailable forms - DL-methionine and  $\alpha$ -hydroxy analogues.

Since its production is of petrochemical origin, traces of many heavy metal impurities like lead and mercury may be carried along, the ecological impact of this seems to be negative, hence leading to regulatory issues on production and use. This is thermally unstable and unavailable too. Hence its use though mandatory has to be restricted, alternates opted.



### 5.6 PHYTOGENIC METHIONINE SIGNIFICANCE

HERBAL METHIONINE is the natural alternate to DL-Methionine, which is the combination of those plants which have same mechanism in the body as of the synthetic dl-methionine. This is the type of amino acid when taken in right proportions is responsible for metabolism, growth and detoxification. It is more thermo stable, economical giving good production. In plants this natural Methionine is available as dipeptides and oligopeptides with the capability of biosynthesis with enhanced bioavailability as per the requirement.

### 5.7 PHYTOGENIC HERBAL METHIONINE

Phytogenic herbal methionine is a natural source of dipeptide and oligopeptide active methionine. In addition it contains enzymes that aid in its conversion and to efficiently replace DL - Methionine and also in the correction of Methionine deficiency, like improves muscular and skeletal growth, plays a role in protein synthesis, enhances FCR, enhanced metabolism especially digestion, recovery from lameness, feather problems.

## 5.8 STUDY ON PHYTOGENIC HERBAL METHIONINE

As per the present study on use of Phytogetic Herbal Methionine vs. Synthetic DL – Methionine. The observations show a significant gain in body weight. The hepatic marker enzymes like Alkaline phosphatase and Aspartate amino transferase were optimized. Thereby reducing stress and hepatic problems. Prevented oxidative damage. Anti-oxidant properties. Better plumage and reduced pecking observed.

## 5.9 HERBAL SOURCES OF PHYTOGENIC NATURAL METHIONINE

Herbal Methionine is the natural alternate to dl-Methionine as it is obtained from those plants which have same action mechanism in the body as that of synthetic dl-methionine. The Alkaloids, terpenes, flavonoids, and glucosinolates etc., are the most active phytochemicals. A synergistic action of these give the desired results. Keeping these in view, the design of this product with the following combination makes the replacement in the same ratio 1:1 and is more bio-available in the blood serum, the product is more heat stable.

### 5.9.1 *Capsicum annum* PAPRIKA

Red pepper, with the scientific name of *Capsicum annum*, belongs to the Solanaceae. 0.2 g/100 g of Methionine forms nearly 26% of its Amino Acid composition.

### 5.9.2 *Trigonella foenum* FENUGREEK

Fenugreek (*Trigonella foenum-graecum* L.) belongs to the *Fabaceae* apart from being a nutraceutical is a very important source of herbal methionine. Available Methionine is 0.61 g/100 g.

### 5.9.3 *Foeniculum vulgare* FENNEL

The dried seeds of Fennel of the Umbelliferae are a storehouse of various nutrients, with low calories and high in different micro and macronutrients. Fennel seed contains 2.088 grams of these amino acids every 100 grams out of which Methionine is 0.1 g.

### 5.9.4 *Helianthus annuus* SUNFLOWER

Common Sunflower (*Helianthus annuus* L.) is a member of the Asteraceae family. Sunflower seed contains 2S albumins that have been associated with methionine-rich 2S albumin (SSA) which may be an IgE-binding protein responsible for anaphylactic reactions. The amino-acid sequence confirmed that the purified 2S albumin protein was the mature form of the methionine-rich storage protein SSA. The pure Methionine is 0.5 g/100 g

### 5.9.5 *Sesum indicum* SESAME

Sesame seed belongs to the genus *Sesamum* of the family *Pedaliaceae*. Sesame is rich in sulfur containing amino acids (3.8–5.5%) with methionine prevailing (2.5–4.0%) of its total Amino acid content that accounts to 2.78g/100 g.

### 5.9.6 *Linum usitatissimum* FLAX

Flaxseed (*Linum usitatissimum* L.), is an annual oil crop. Flaxseed has an appreciable amount of sulfur-based amino acids mainly cysteine and methionine. While Methionine is about 1.5 g/100 g

This phytogetic mixture is a scientific formulation of a combination of herbs rich in Herbal Methionine both in its free and conjugated form along with S – adenosyl methionine and phosphatidyl choline. The S – adenosyl methionine acts as a methyl donor helping in the formation of the homocysteine and phosphatidyl choline along with methionase like substances present convert Homocysteine to bio available Methionine. As a lipotropic agent with anti-oxidant properties it improves the alpha tocopherol levels there by the production performance and increased egg weight. The precursors and intermediates of herbal Methionine, like folic acid also act as a methyl group donors and prevent fatty liver and through the trans-methylation process convert amino acids to provide biological energy

## 6 PHYTOGENIC HERBAL METHIONINE'S APPLICATIONS IN POULTRY

- For optimum protein metabolism, energy utilization growth, assimilation of lean meat at the muscles of breast and thigh.
- For providing optimum activity of Methionine leading to better FCR
- For higher egg production and optimum egg size, improving the hatchability.
- For better quality and faster growth of feathers this minimizes feather pecking.
- As a methyl donor helps prevent fatty liver syndrome and other hepatic problems.
- Protection from stress, protein catabolism and related conditions like Edema, Ascites etc.
- Enhanced digestive metabolism and improved immunity.

Natural substitute to replace synthetic methionine.\* Increases intestinal villi development.

Alleviates stress due to low protein diet or high temperature.\*Controls fat metabolism and prevents fatty liver syndrome.\* Improves body weight and FCR. \*Optimizes egg production and egg weight in poultry.

The results obtained provide clear evidence of the potential of Phytogetic Herbal Methionine Metho Add phyto-additive, as substitute of synthetic Methionine sources, also showed that phytogetic

herbal methionine can replace Synthetic Methionine with unaltered activity throughout, without reducing growth performance, increasing fat accretion and changing serum biochemical characteristics, with better performance and economics.

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