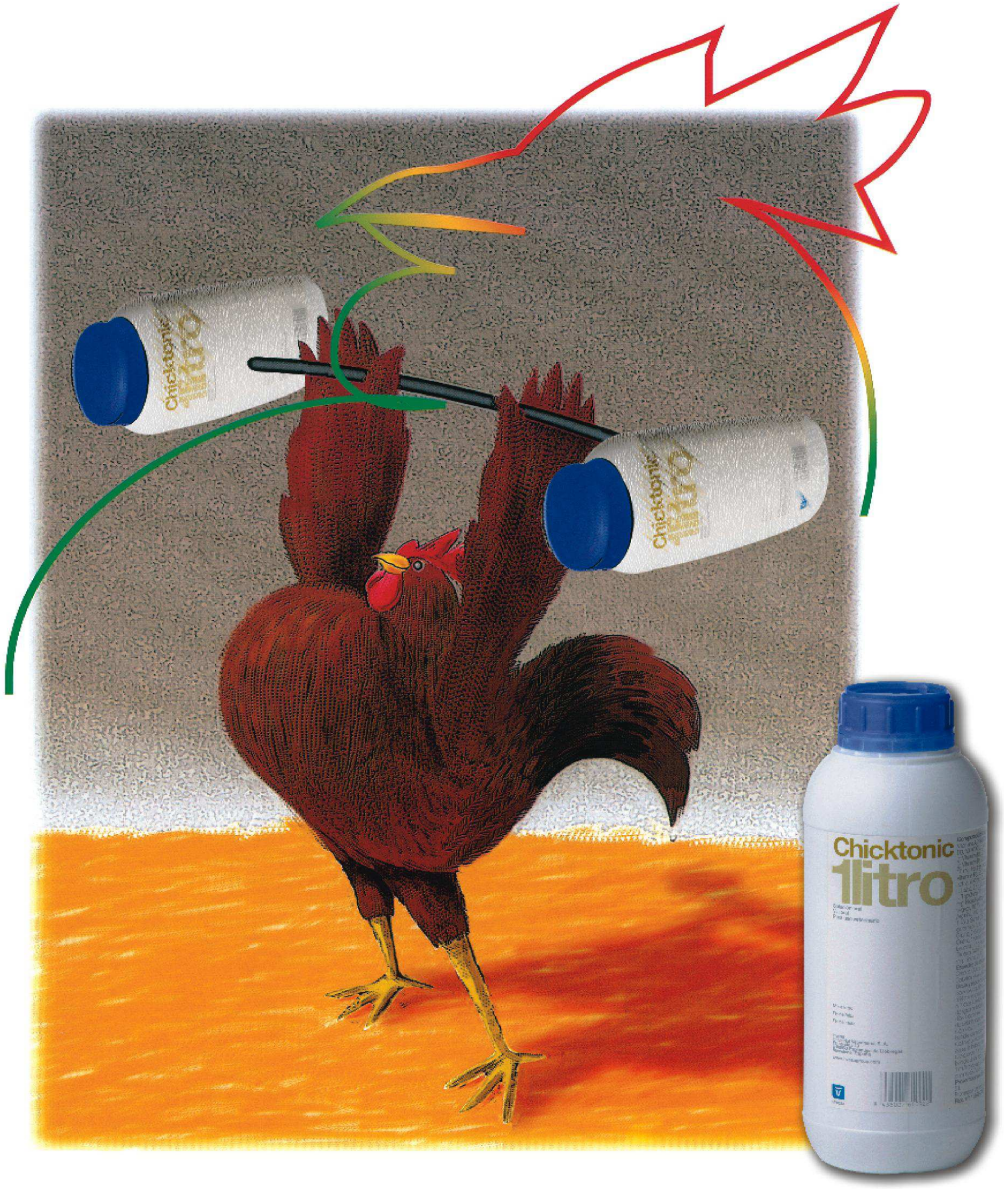
Chicktonic



TECHNICAL DOSSIER

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1. WHAT IS CHICKTONIC?

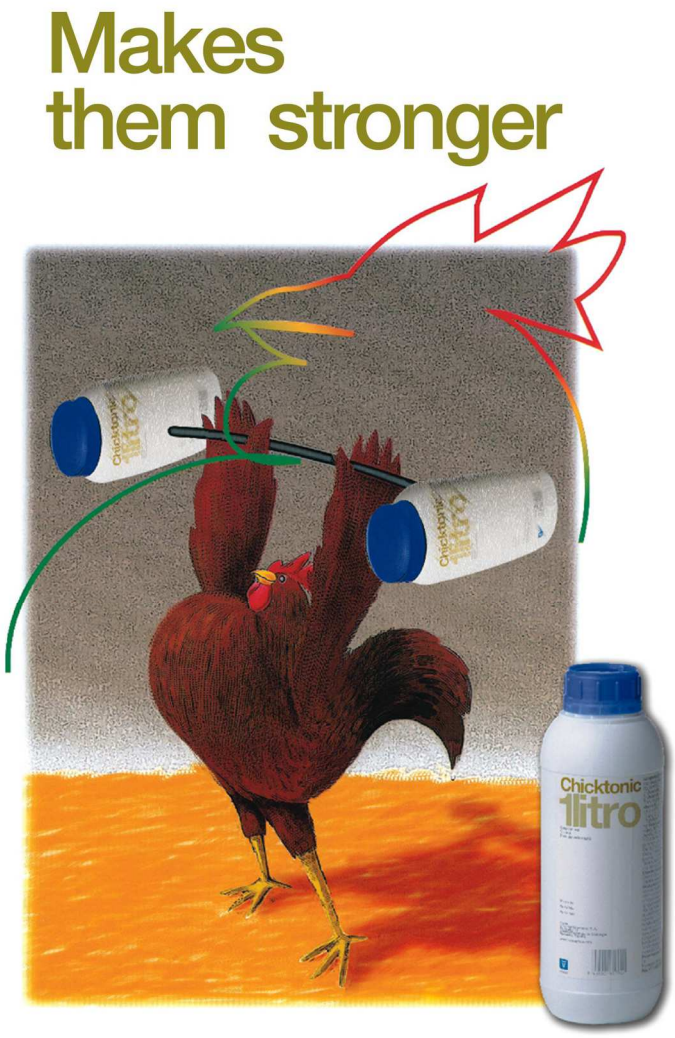
Chicktonic is a complex of hydro and fat-soluble vitamins and amino acids in liquid form.

Chicktonic is indicated to correct and prevent avitaminosis and malnutrition and as a support in high-demanding production states and stressful situations.

Chicktonic can be administered to all animal species.

The standard dose is 1-2 ml of Chicktonic per litre of drinking water for 5-7 days and the way of administration is by oral route in drinking water.

Chicktonic is sold in bottles of 100 ml, 1 litre and 5 litres.



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Chicktonic

Vitamin-amino acid premix
Oral route

Composition:
Vitamin A, 2,500,000 I.U.; Vitamin $D_{3,}$ 500,000 I.U.; Vitamin E, 3.75 g; Vitamin $K_{3,}$ 250 mg; Pyridoxine, 2 g; Riboflavine, 4 g; Thiamine, 3.5 g; Dexpanthenol, 15 g; Vitamin $B_{12,}$ 10 mg; D,L-Methionine, 5 g; Choline, 400 mg; L-Lysine, 2.5 g; Histidine, 900 mg; Arginine, 490 mg; Áspartic Acid, 1.45 g; L-Threonine, 500 mg; Serine, 680 mg; Glutamic Acid, 1.16 g; Proline, 510 mg; Glycine, 575 mg; Alanine, 975 mg; Cystine, 150 mg; Valine, 1.1 g; Leucine, 1.5 g; Isoleucine, 125 mg; Tyrosine, 340 mg; Phenylalanine, 810 mg; Tryptophane, 75 mg; Biotin, 2 mg; Inositol, 2.5 mg; Excipient q.s.1 littre.

Species of destination: All species.

Dosage: Poultry: Layers: 2 ml/litre of drinking water for 5-7 days; Broilers: 1 ml/litre of drinking water for 5-7 days. Other species: 1-2 ml/litre of drinking water for 5-7 days. Oral route in drinking water

Contraindications, interactions and side effects: Not described.

Overdosage: Overdosage is unlikely due to its composition.

Withdrawal time: Not required.

Storage conditions: Keep well closed protected from heat, moisture and light.

Presentations: Bottles of 100 ml, 1and 5 litres.

Keep out of the reach of children

2. INGREDIENTS OF CHICKTONIC

■ VITAMINS

Vitamins are organic compounds in food that are needed in very small amounts for various metabolic processes and other functions.

Vitamins can be classified in two main groups: hydro-soluble and fat-soluble. Hydro-soluble vitamins are those that belong to the B complex plus vitamin C. Fat-soluble vitamins are vitamin A, vitamin D_2 and D_3, vitamin E and vitamin K.

	Hydro-soluble vitamins	**Fat-soluble vitamins**
Vitamins	Group B, C	A, D3, E, K
Absorption	Passive diffusion	Intestinal with fats (bile)
Functions	Co-enzyme (B)+ apo-enzyme→ enzyme	Specific and independent. Synthesis of some proteins.
Storage	No. Frequent ingestion is needed	In fatty tissue.
Excretion	Urine	In faeces (via bile)
Toxicity	No	Over 500 times the recommended daily amount.

In bovine, ovine and pocine, vitamin D_2 and D_3 are equally effective, but in poultry the activity of vitamin D_2 is just the 10% of the activity of vitamin D_3. So vitamin D_3 is more effective than vitamin D_2 in poultry. (McDonald, Nutricion Animal, 1993).

Fat-soluble vitamins are contained in the fat portion of food that contains fat-soluble vitamins. They are stored in the liver and adipose tissues and are eliminated much more slowly than water-soluble vitamins.

Chicktonic contains vitamin A, vitamin D_3, vitamin E and vitamin K_3, so **all** fat-soluble vitamins are represented.

Hydro-soluble vitamins dissolve in water and are not stored in the body; they are eliminated in urine. They must be supplied more often than fat-soluble vitamins.

The B Group Vitamins are quite different in their chemical structures but are grouped together because they were first isolated as a vitamin complex from yeast and liver. The B Group Vitamins are often called coenzymes because their function is to help enzymes in the body perform chemical reactions. Each of the B Group Vitamins has a specific role in the body.

The main functions of the B-group vitamins are related to providing energy from macronutrients and they are involved in protein, carbohydrate and fatty acid metabolism. The metabolic function of B-vitamins to some extent is specific but also interdependent to complete various metabolic pathways. There are no significant reserves of B-group vitamins in any organs with the exception of organs with higher metabolic requirements such as kidneys, liver and heart, which may have some vitamin reserves.

Although present in many foods, the B-group vitamins are delicate and easily destroyed, particularly by heat treatments.

B-group vitamins are: Vitamin B_1 (thiamine, thiamin), Vitamin B_2 (riboflavin), vitamin B_3 (niacin, niacinamide, nicotinic acid), Vitamin B_5 (pantothenic acid), Vitamin B_6 (pyridoxine), Vitamin B_8 or H (biotin), Vitamin B_9 (folacin, folic acid), Vitamin B_{12} (cyanocobalamin, cobalamin), choline and inositol.

Niacin can be synthesised from the amino acid tryptophane in body tissues. So if there is enough tryptophane in the diet, niacin requirements are low. (McDonald, Nutricion Animal, 1993).

Deficiency in folic acid is rare in domestic animals because it can be synthesised by intestinal microorganisms. Only chicks could be more susceptible.

Chicktonic contains vitamin B_1 (thiamin), B_2 (riboflavin), sodium panothenate (B_5), B_6 (pyridoxine), biotin (B_8 or vitamin H), B_{12} (cobalamin), choline (vitamin B_4) and inositol, so **the most significative** hydro-soluble vitamins are represented.

■ AMINO ACIDS

Amino acids are basic structural components of proteins. Although more than 200 amino acids have been isolated from organic compounds, only 20 of them are found in proteins.

Chicktonic contains the 18 amino acids that are usually found in natural proteins. (McDonald, Nutricion Animal, 1993)

Amino acids can be divided into essential and non-essential. Essential amino acids are those which can not be synthesised by the body at the same rate as required to meet physiological need. So they must be supplied. Essential amino acids are:

Methionine, Lysine, Arginine, Threonine, Cystine, Tryptophane, Alanine, Leucine, Isoleucine, Valine

Non-essential amino-acids can be synthesised by the body from the essential ones.

Chicktonic contains **all** the essential amino acids and several non-essential ones

3. VITAMINS AND AMINO ACIDS IN POULTRY

■ VITAMINS

Nutrient	**Clinical signs of deficiency related to:**
Vitamin A	Epithelium. Nervous tissue. Growing
Vitamin D_3	Calcium metabolism (rickets)
Vitamin E	Encephalomalacia (muscular, neurological, vascular)
Vitamin K	Blood coagulation (haemorraghes, anaemia)
Vitamin B_1	Peripheral nervous stimulus. Paralysis
Vitamin B_2	Cell respiration. Paralysis. Growing. Diarrhoea
Sodium pantothenate	Dermatitis. Feather growing. Growing. Incubability
	Black tongue. Feather growing. Perosis
Vitamin B_6	Appetite. Growing. Perosis. Excitability
Vitamin B_{12}	Growing. Anaemia. Perosis. Feather growing. Incubability
Choline	Growing. Perosis. Fat content in the liver
Biotin	Dermatitis. Incubability. Fatty liver and kidney syndrome

(Miguel Pontes. Higiene y Patología Aviar, 2006. Real Escuela de Avicultura, pp 304)

Vitamin A is essential for growth, for the development and maintenance of epithelial tissue, and for vision particularly in dim light.

Ataxia by vitamin A deficiency is caused by the compression of the nervous central system due to a delay in the development of bone tissue. Deficiencies in vitamin A are most likely to occur in chicks under 7 weeks of age. Since a large amount of vitamin A is stores in the egg yolk, this supplies the newly hatched chick with adequate amounts for the first few weeks of life. Laying hens deficient in vitamin A will often produce chicks that show vitamin A deficiency in addition to signs of deficiency in the hens. In certain instances laying hens experience vitamin A defficiency because of increased demands for nutrient associated with egg production. (Jakowski, R. & Kaufmn, G. Avian Nutritional Diseases. Tufts Open Course Ware 2006: http://ocw.tufts.edu/Content/5/lecturenotes/215759)

Vitamin D_3 is involved in the regulation of calcium and phosphate homeostasis and bone mineralization.

Laying hens are specially vulnerable to deficiencies of vitamin D3, calcium and phosphorus because of the high demand for these nutrients required for egg production. Caged layer fatigue is an osteoporosis produced at the beginning of the laying stage due to the stress associated to meet the requirements to form egg shells. They develop bone deformities and even fractures of sternum and ribs.

Source: Real Escuela de Avicultura

Vitamin E acts as an antioxidant, protecting vitamins A and C, red blood cells and essential fatty acids from destruction. It is also involved in reproduction and enhances the body's immune mechanisms.

Vitamin E deficiency causes muscular alterations. Usually they are dystrophic lesions of breast muscles, but they can also be found in the myocardium and skeletal muscles. It normally affects growing birds. Birds are in sternal recumbency and look tired. It causes hyalin degeneration of musculare fibres. When cardiac muscle is affected, signs are weakness, cyanosis and sudden death. (Higiene y Patología Aviar, 2006. Real Escuela de Avicultura, pp 308).

Encephalomalacy (also called crazy chick disease) is also associated to vitamin E deficiency. It causes ataxia, tilted head and lack of control of hind limbs. Once that neurologic symptoms appear, they are not reversible, even if vitamin E is supplied. (Higiene y Patología Aviar, 2006. Real Escuela de Avicultura, pp 311).

Vitamin E deficiencies are usually related to rancid fats in the feed, excessive fat content in the feed and absence of antioxidants in the feed among others.

Vitamin K is essential for normal blood functions. Without Vitamin K, blood cannot clot.

Vitamin B_1 (**thiamine**, **thiamin**) helps to convert glucose into energy and has a role in the development of red blood cells and the maintenance of muscle tissue.

Beri-beri or polyneuritis is associated to vit. B_1 deficiency. It is rare in pullets but it can appear in cases of Amprolium overdosage. It is characterised by anorexia, weakness, paralysis and some birds presenting “tilted heads”. Beri-beri can be prevented or corrected by adding higher amounts of thiamin. (Higiene y Patología Aviar, 2006. Real Escuela de Avicultura, pp 311).

Vitamin B_2 (**riboflavin**) is involved in energy metabolism and supports vision and skin health.

Lack of riboflavin in the diet of chicks causes extremely slow growth, diaorrhea and poor feed utilization in the first week. After 2 or 3 weeks, curled toe paralysis appears. Birds have their head, tail and wings low and the skin is dry and scaly. (Ibrahim M.,1998. Riboflavin deficiency in chicken. *World Poultry 14:4*, pp 20-21)

Source: Real Escuela de Avicultura

In breeding hens, riboflavin deficiency leads to a reduction up to 30% in egg production and up to 70% in hatchability. Riboflavine-defficient embryos that have failed to hatch are dwarfed and show oedema. Peak embryonic mortality of about 70-80% occurs at about the 10^{th} day of incubation.

Riboflavin deficiency is rapidly reversible in the initial stages by administration of B_2 supplements, but it is not curable in its acute states. It is important to ensure adequate levels of this vitamin in the starter, the grower and the breeder diets.

Sodium pantothenate (**vitamin B_5**) is needed to metabolise carbohydrates, proteins and fats.

Vitamin B_6 (**pyridoxine**) is needed for protein and fatty acid metabolism, the formation of red blood cells and certain brain chemicals. It influences brain processes and development, immune function and steroid hormone activity.

Biotin (**vitamin B_8** or **vitamin H**) is needed for energy metabolism, fat synthesis, amino acid metabolism and glycogen synthesis.

Fatty liver and kidney syndrome is basically caused by biotin deficiency. It affects broilers aged between 10 and 30 days fed mainly with cereals. An increase in the fat content of liver, kidneys and other viscera occurs. Affected birds, both males and females, lay on their sternum with the neck stretched out and die in a few hours. Mortality can reach up to 20-30%. Availability of biotin in some cereals (wheat, barley) is low. Furthermore, biotin can be inactivated by rancid fats and strepavidine. Fatty liver and kidney syndrome is usually controlled by adding biotin to the diet. (Higiene y Patología Aviar, 2006. Real Escuela de Avicultura, pp 306).

Vitamin B_{12} (**cobalamin**) is involved in the production and maintenance of body cells and the breaking down of some fatty acids and amino acids. It plays an important role in growth and in maintaining a healthy nervous system.

Choline is used in the synthesis of the phospholipids, phosphatidylcholine and sphingomyelin, structural components of all human cell membranes. Choline is a precursor for acetylcholine, an important neurotransmitter, involved in muscle control, memory, and many other functions.

Inositol plays an important role in the health of cell membranes, especially in the brain, bone marrow, eyes and intestines, and it allows for the proper functioning of cells.

With current production practices it is rare to find cases of pure deficiencies, but this does not mean that there are no problems related to vitamin deficiencies. Although we have described here several pure deficiencies, usually it is rather difficult to identify them as isolated problems.

■ AMINO ACIDS

Nutrient	**Clinical signs of deficiency related to:**
Protein and essential amino acids	Poor growth rate, egg production and feed efficiency, moulting, poor feather condition
Lysine	Reduced growth rate, haemoglobin and haematocrit, depigmentation of feathers, poor feed efficiency
Methionine	Poor growth rate, egg production and egg size, poor feathering and feed efficiency

(D. Narahari. Nutritional diseases and disorders in poultry. *World Poultry 15:11*, pp 52-54, 1999)

Animals can not synthesize the group amino, so they need to receive amino acids from diet. Some amino acids can be obtained from others by a transamination, but other amino acids can not be synthesized by the body and are called essential amino acids.

There are 10 essential amino acids: Methionine, Lysine, Arginine, Threonine, Cystine, Tryptophane, Alanine, Leucine, Isoleucine, Valine

Poultry need the ten essential amino acids mentioned as well as glycine. In ruminants, for example, ruminal microorganisms synthesize all essential amino acids. However, the maximum potential in growing and milk production can not be achieved if the diet does no provide the adequate amount of amino acids.

Protein deficiency occurs when there are not enough essential amino acids in the diet or when there is not an excess of essential amino acids to synthesize non-essential amino acids. Essential amino acids are also called limiting amino acids because protein deficiency depends on the deficiency in one or more essential amino acids.

Alanine goes through alanine cycle to generate glucose from protein.

Arginine plays an important role in cell division, the healing of wounds, removing ammonia from the body, immune function, and the release of hormones.

Aspartic acid might serve as an excitatory neurotransmitter in the brain. It is also a metabolite in the urea cycle, and participates in gluconeogenesis

Cystine helps form healthy skin, hair, bones, and connective tissue. It functions as an antioxidant, deactivate free radicals and neutralize toxins.

Deficiency of vitamin E associated to cystine deficiency can cause muscular alterations. Usually they are dystrophic lesions of breast muscles, but they can also be found in the myocardium and skeletal muscles. It normally affects growing birds. (Higiene y Patología Aviar, 2006. Real Escuela de Avicultura, pp 308).

Glutamic acid is an important excitatory neurotransmitter and itis also important in the metabolism of sugars and fats.

Glycine is essential for the biosynthesis of nucleic acids as well as of bile acids, porphyrins, creatine phosphate, and other amino acids.

Histidine is a precursor for histamine and carnosine biosynthesis.

Isoleucine is needed for the formation of haemoglobin as well as assisting with regulation of blood sugar levels as wll as energy levels. It is also involved in blood -clot formation.

Leucine is essential for optimum growth and for nitrogen equilibrium in adults. It is suspected that it plays a part in in maintaining muscles by equalizing synthesis and breakdown of proteins.

L-Lysine plays a major role in calcium absorption, building muscle protein, recovering from surgery and the body's production of hormones, enzymes, and antibodies.

Lysine deficiency leads to feathering problems. (Higiene y Patología Aviar, 2006. Real Escuela de Avicultura, pp 312).

D,L-Methionine assists in the breakdown of fats and participates in processes to detoxify the liver. It is an antioxidant.

Phenylalanine is an aromatic amino acid which is closely involved with the nervous system.

Proline is involved in collagen formation.

Serine is required for the metabolism of fat, tissue growth and the inmune system as it assists in the production of immunoglobulins and antibodies. It is important in the formation of cell membranes, involved in the metabolism of purines and pyrimidines and muscle synthesis.

Threonine is required to help maintain the proper protein balance in the body, as well as assist in the formation of collagen and elastin in the skin. It is further involved in liver functioning (including fighting fatty liver), lipotropic functions when combined with aspartic acid and methionine as well as assisting the immune system by helping the production of antibodies.

Threonine deficiency depresses the development of the immunity. (Higiene y Patología Aviar, 2006. Real Escuela de Avicultura, pp 314).

Tryptophan is a precursor of serotonin, a neurotransmitter that is important for normal nerve and brain function. Serotonin is important is sleep, pain control, inflammation, intestinal peristalsis, etc.

Tryptophan deficiency leads to feathering problems. (Higiene y Patología Aviar, 2006. Real Escuela de Avicultura, pp 312).

Valine is needed for muscle metabolism, repair and growth of tissue and maintaining the nitrogen balance in the body.

Valine deficiency depresses the development of the immunity. (Higiene y Patología Aviar, 2006. Real Escuela de Avicultura, pp 314).

Proteins are required for the regulation of body processes such as growth and tissue maintenance, and excess protein can be converted into carbohydrate and used to provide energy. Therefore, a deficiency of protein commonly accompanies a deficiency of energy. Insufficient protein intake in young animals results in reduced appetite, lowered feed intake, inferior growth rate, lack of muscle development and a prolonged time to reach maturity. In mature animals there is loss of weight and decreased milk production. In both young and mature animals there is a drop in hemoglobin concentration, packed cell volume, total serum protein and serum albumin. In the late stages there is edema associated with the hypoproteinemia.

4. INDICATIONS OF CHICKTONIC

The use of Chicktonic is recommended in cases of malnutrition and malabsorption, highly-demanding production stages, stressful situations and periods of convalescence.

- Malnutrition and malabsorption

Malnutrition and malabsorption are caused by the insufficient nutrient intake or uptake, which can be caused by several factors:

- Decreased feed consumption caused by bacterial, viral or fungical diseases
- Decreased feed consumption due to stress
- Damage to the intestinal mucosa due to diseases (such as Coccidiosis, Histomoniasis, Mycotoxicosis, Salmonellosis, Malabsorption or Runting Stunting Syndrome, Proventriculitis, Viral enteritis, parasites, etc.) reduces the availability of vitamins and other nutrients
- Increased needs due to high production systems, disease, parasites, etc.
- Interaction with substances (antibiotics, anticocidials, etc.):
    - Amprolium antagonizes vitamin B_1
    - Sulphoquinoxaline antagonizes vitamin K
- Bad quality of feed, due to:
    - low quality of raw materials
    - degradation of nutrients during the manufacturing processes
    - bad conditions during the conservation or storage of raw materials, grain or concentrate: excessive temperature, oxidation of lipids, mycotoxins, etc.
    - contamination of the feed with mycotoxins or bacterial toxins, that interfere with absorption from the intestine or with metabolism
    - interactions between substances:
        - Dicumarol, present in several vegetables, antagonizes vitamin K
        - Rancid fats inactivate biotin and vitamins A, D and E
        - Thiaminase (fish) and pyrithiamin antagonize vitamin B_1
        - Strepavidine (in Streptomyces) antagonizes biotin
        - Mycotoxin T2 reduces the content of vitamin E in plasma

- Highly-demanding production stages

In highly-demanding production stages, requirements are higher than usual and it is recommended to help animals with supplemental vitamins and amino acids.

In chicks, supplementing a nutritional complex for the first 48h after hatch accelerates the development and maturation of the intestinal villi and improves the overall performance of the bird. Furthermore, the body weight at 7 days is correlated with the weight at slaughter

In broilers growth can be affected by irregular and insufficient provision of vitamins and amino acids.

In layers, egg production, egg size and egg shell quality can be affected by irregular and insufficient provision of vitamins and amino acids.

In breeders, nutrition plays an essential role in the embryo development. Supplementing a nutritional complex enhances the viability and uniformity of ckicks.

- Stressful situations

Some of the most common causes of stress in a poultry farm are: arrival at the farm, vaccination, debeaking, treatments against parasites, treatments with antibiotics, heat stress, environment, etc.

After stress, birds are able to partially compensate the growth retardation occurred if favourable conditions and good nutrition are provided. Birds increase protein retention during periods of compensatory growth, so the requirement of birds for key amino acids during the recovery phase is greater.

One of the important factors in stress is the effect on the small intestine. The length of small intestinal villi and overall surface are decreased. These effects can also be achieved by fasting. The length of intestinal villi does not recover until 2 or 3 days after returning to favourable conditions. A reduction in absorptive cells could limit the ability of the bird to absorb nutrients whose uptake requires a transport system across the intestinal epithelium. These

limiting nutrients can restrict compensatory growth and cause a failure of performance, as has been seen with d-methionine. (Azevedo & Dibner., 2006. Maximising gut health for peak performance. *International Poultry Production* 14:5, pp. 17-20). So it is recommended to increase the amount of key nutrients, as amino acids and vitamins, in stressed animals.

- Periods of convalescence

Bacterial and parasitic diseases increase the metabolic rate (fever, increased respiratory and heart rate, etc.) and, given that during acute disease periods animals diminish feed intake, nutrient needs are increased.

Also and as mentioned above, it is important to increase the amount of key nutrients in case the intestine has been affected by fasting, for instance, and has the absorptive function decreased.

B group vitamins can be synthesised by intestinal microorganisms. After a treatment with antibiotics, intestinal microorganisms can be affected, resulting in a decrease in bacterial synthesis of vitamins. In order to compensate this, vitamins must be supplied from an extra source.

A convalescent animal will probably eat less quantity of feed than a healthy one. The concentration of amino acids and vitamins must be increased in its daily diet and a good way to do so is via the drinking water.

5. LIQUID FORM vs SOLID FORM

Chicktonic is an oral solution for the drinking water.

Thanks to its excipients, Chicktonic is completely hydrosoluble and hydrodispersable.

Once administered in the drinking water, the resulting solution is homogenous.

Our experience has demonstrated that Chicktonic do not block drinkers.

Given the fact that a convalescent animal will eat less quantity of feed than a healthy one but will drink the same amount of water or probably even more, it is recommended to administer Chicktonic in water.

6. USES OF CHICKTONIC

■ BROILERS

Age	0 days	7 days	21 days	35 days	48 days
Weight	37.4 g	108.5 g	512.5 g	653.5 g	2037 g

(J.I. Barragan. Recepción y alojamiento del pollito de un día. Repercusiones sanitarias durante la crianza. Jornadas Profesionales de Avicultura de Carne 2004)

We can differentiate 4 stages in the broiler production system (Julián Martínez. El manejo del pollo de carne desde el primer día de vida hasta el sacrificio. Jornadas Profesionales de Producción de Carne, 22-26 mayo 2000):

- Starting: from day 0 to day 10th

Several authors have stated that inadequate nutrition causes more morbility than dehydration in chicks. (Viera S.L. & Moran E.T. jr., 2001).
The pullet is born with low levels of lipase and biliar salts, so the best productive results in this stage are obtained feeding a diet of 50% protein and 50% carbohydrates and no fats. After hatching, a day old chicken has very little reserves of B-vitamins available to meet its physiological metabolic requirements. It is interesting to supply an extra source of amino acids and vitamins in order to meet these requirements. (Noy Yael, 2006).

Intestinal villi need 6-8 day in the duodenum and 10 days in the jejunum and ileum to be completely developed. The rapid access to solid feed determines a quicker development of the intestinal tract. Some authors suggest providing nutritional supplements for the first 24-48h in order to avoid a delay in the intestinal development (Ortiz Andrés, 2004).

Administering a liquid nutritional supplement for 48h to chicks just after hatching leaded to a body weight increase of a 8-10% at the end of their lives, compared to chicks fastening or supplemented just with water (Noy Yael, 2006). A delay in feed supply to 1 day-old chicks causes a loss of weight of 100-200 g at 40 days. Several authors also correlate the body weight at 7 days with the weight at slaughter (Ortiz Andrés, 2004).

- Growing: from day 10th to day 21st

Breast development seems to be more related to the amino acid intake in the growing stage (day 14th to day 37th) than the starting stage (day 0th to day 14th) (Rafael Durán, 2004).

- Transition: from day 21st today 30th

Breast development seems to be more related to the amino acid intake in the growing stage (day 14th to day 37th) than the starting stage (day 0th to day 14th) (Rafael Durán, 2004).

- Finishing: from day 30th to day 45th-49th

In animals fed ad libitum, fat deposition increases with age. The maximum development of fat tissue occurs at 6-7 weeks in males and 4-5 weeks in females. The aim of nutritional management in this stage must be to reduce excessive fat deposition. This can be done by:

- Increasing the diet protein content, together with a moderate-low dietary energy level. A high protein intake diminishes hepatic lipogenesis. In addition, the urinary excretion of non-metabolised nitrogen increases, and this implies an increased energetic cost (Rafael Durán, 2004).

- Supplementing essential amino acids increases breast yield and diminishes abdominal fat, especially in males, when it is done from the 3rd to the 6th week. (Rafael Durán. Factores nutricionales que afectan las características de la canal del pollo. Selecciones Avícolas Agosto 2004, pp. 501-509).

Example: Broilers- Production stages (days)

Starting stage:

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day10

Growing stage:

Day11	Day12	Day13	Day14	Day15	Day16	Day17	Day18	Day19	Day20	Day 21

Transition stage:

Day 21	Day 22	Day 23	Day 24	Day 25	Day 26	Day 27	Day 28	Day 29	Day 30
									

Finishing stage:

D.31	D.32	D.33	D.34	D.35	D.36	D.37	D.38	D.39	D.40	D.41	D.42	D.43	D.44	D.45
														

 Administration of Chicktonic

Chicktonic is administered:

- at the reception of chicks: stress, vaccination, treatment with antibiotics
- at the 2nd week: vaccination, stress, treatment with antibiotics, low body weights
- at days 10th, 11th and 12th: debeaking, stress
- at the 4th-5th week: treatment with anticoccidials, treatment with antibiotics, maximize growth
- at the 6th-7th week: treatment with antibiotics

■ LAYING HENS

(Jesús Carrizo, 2005)

In laying hens we differentiate several **growing stages**:

- Initial stage: 1st-3rd weeks

During this period pullets will increase its body weight by 5 times, so they have high needs in proteins and essential amino acids.

- Growing: 3rd-10th weeks

During this period pullets will increase again its body weight by 5 times, but the digestive system is better developed and the needs in proteins and essential amino acids and energy are not so high.

- Development: 10th-16th weeks

During this period growth diminishes. The digestive system is completely mature and the needs in proteins, minerals and energy are much lower. Feed intake increases and more fibre is needed.

In laying hens we differentiate several **laying stages**:

- Pre-laying period: from the 16th week to 2-5% of laying (normally about the 18th week)

Medular bone development starts from the 16th week, so levels of Ca and P are very important in this stage to avoid future problems on eggshell quality. Needs of protein and energy are intermediate between growing and laying.
In laying hens calcium metabolism is very important to form eggshells. Vitamin D plays an essential role in bone mineralisation. It is involved in the regulation of calcium and phosphate homeostasis.

- Laying peak: from 5% until egg production decreases to 90% (normally from the 18th week to the 35th week)

Given that during this period the goal is to increase egg size and feed intake is low, protein requirements are very high.

- Production: 35th-55th weeks

Hens have stopped growing and have reached the desired egg size. Protein requirements decrease.

- Final stage: from the 55th week

In order to control the egg size, protein levels must be reduced.

Example: Laying hens - Growing stages (weeks)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
●			●	●				●		●				●		●			

● Administration of Chicktonic

Chicktonic is administered:

- at the reception of pullets (1st week): stress, vaccination, treatment with antibiotics, debeaking
- at the 4th-5th week: treatment with anticoccidials
- at the 9th week (entrance to cages): stress, vaccination, treatment with antibiotic
- at the 11th, 15th and 17th weeks: together with vaccination

■ BREEDER HENS

In breeders, vitamins play an important role in the embryo development. If the level of vitamins in the diet is low, the transfer of nutrients to the egg is at risk. This leads to an increased mortality of the embryo in the final phase of development and deficiencies in the viability and uniformity of chicks. (Kenny M. & Kemp C., Nutrición de los reproductores y calidad del pollito. *International Hatchery Practice, vol. 14, num. 4*)

During the first few days after hatching, the chicken is dependent upon the supply of fat-soluble vitamins from the maternal source. The Malabsorption Syndrome in broilers is a typical case where fat-soluble vitamin absorption insignificantly reduced. During the critical period of the infection, supplementation of fat-soluble vitamins via feed or drinking water is usually ineffective. Adequate vitamin reserves from the maternal source and an additional supply during the recovery period must be ensured to minimise adverse economic effects such as reduced growth rate, feed conversion efficacy, poor immunity response to vaccination, etc. (Balkar S. Bains, 2001).

■ USES BY OUR CUSTOMERS

Examples:

At the reception of chicks, between 2 or 5 days.

During or after management practices or treatments (eg.: treatments against parasites, antibiotic treatments, debeaking, etc.), between 2 or 5 days.

Malaysia (Oct. 2007):
In **partridges Chicktonic** is administered as follows:

- Age of sacrifice: 30 days
- Age of administration: 14 days
- Duration of administration: 3 days, in drinking water
- Dosage: 1 ml Chicktonic / 1 litre of drinking water
- Advantages: the farmer reports faster growing
- Benefits: partridges reach final weight at 27 days →age of sacrifice: 27 days instead of 30 days

Egypt (May 2009):
In **laying hens Chicktonic** is administered:

- Period of administration: the first 5 days of laying
- Comparison between 2 flocks
- Dosage: 1 ml Chicktonic / 1 litre of drinking water
- Advantages: the farmer reports a significant increase in egg production

7. CONCLUSIONS

Invesa's Chicktonic is a complex of hydro and fat-soluble vitamins and amino acids in liquid form.

Chicktonic has a balanced formula that contains **all** the essential amino acids and several non-essential ones, **all** fat-soluble vitamins and **the most significative** hydro-soluble vitamins.

Chicktonic can be used in all animal species.

In poultry, Chicktonic is recommended in broilers, layers and breeders as a support supply in periods of intensive production, when other treatments are applied (vaccines, antibiotics, antiparasitics…), accompanying low-quality feed,

in situations of stress that lead to decreased feed intake and to help birds to recover in periods of convalescence.

Chicktonic is very soluble. The standard dose is 1-2 ml of Chicktonic per litre of drinking water for 5-7 days and the way of administration is by oral route.

Chicktonic is sold in bottles of 100 ml, 1 litre and 5 litres.

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