NutroCorp international
Natural products for healthy chickens

The positive effects of Nutro Meat and its ingredients on broilers

-SCIENTIFIC & PRACTICE RESEARCH-

PRACTICE RESEARCH

Indications
Better health, stronger immune system, higher resistance to infections and viruses, better vitality and better feed conversion.

Implications
Better production data, less mortality and less rejection by the slaughterhouse.

The practice research was initiated by NutroCorp International and was carried out with the approval and cooperation of 12 participating Dutch poultry companies, in close collaboration with:
- Advee veterinarians The Netherlands : adVee Dierenartsen - Voor gezond boeren;
- Feed experts from De Heus Animal Feed The Netherlands : De Heus Nederland (de-heus.nl));
- Feed experts from Mercordi Animal Care Belgium : Mercordi - Home (mercordianimalcare.com)).

The practice research into the positive effects of the natural product Nutro Meat and its ingredients on broilers was carried out from September 1, 2022 to April 30, 2023, during 5 consecutive rounds of 42 days each, at 12 Dutch poultry companies, in different geographical regions in The Netherlands.
About 2 million broilers were examined and closely monitored.

During the research, all figures and results were accurately recorded, stored and analyzed by veterinarians and feed experts and by means of specific software, specially developed for the poultry sector, that is used during regular business operations by both the poultry farms and their veterinarians and external advisors.

In order to calculate the effects on the profitability of the poultry farms, the cost calculations were performed using KWIN, the Quantitative Information Agriculture handbook of Wageningen University & Research, The Netherlands. In the broiler performance comparison you will find all the figures resulting from the studies and results.

'Torque 1-without Nutro Meat' and 'Torque 2-with Nutro Meat' in the broiler performance comparison, give the weighted averages of the research results of all 12 poultry farms involved in the research.

Research methodology
At every poultry farm that was researched, Nutro Meat was added to the drinking water of the broilers, simultaneously in multiple houses, directly at the beginning of each round (on the 1st day of the life cycle of the broilers), while simultaneously in each round in 1 house no Nutro Meat was added to the drinking water of the broilers (the control group in 'the control house').

This research methodology was chosen to continuously monitor each poultry farm during and after each round. This enabled the researchers to compare the positive results of Nutro Meat with the results in the control houses without Nutro Meat.

NutroCorp international

Natural products for healthy chickens

Main results of the studies (SEE ATTACHED BROILER PERFORMANCE COMPARISON)

* A better feed conversion
* A lower mortality rate
* Less rejection by the slaughterhouse
* HIGHER TOTAL NET MARGIN for the poultry company: average +22.7%

+ HEALTHIER and STRONGER broilers,
with BETTER quality and SUSTAINABLE meat,
with less/NO antibiotics.

Conclusion

By using the natural product Nutro Meat, with its natural ingredients and its positive effect on the health and strength of broilers (see also the attached scientific research), the poultry company can produce healthier chickens in a responsible, safe and sustainable manner, with better quality and more sustainable meat (with less/no antibiotics) and can thereby generate more net profit for his company at the same time.

Recommendations for the use of Nutro Meat

-The recommendations for the use of Nutro Meat apply to the entire life cycle period, from the first day of the life cycle: see the administration protocol for the exact dosage.
-The average dosage is very low: 5 ml Nutro Meat per 1,000 liters of drinking water

NutroCorp international
Natural products for healthy chickens

SCIENTIFIC RESEARCH

The natural product Nutro Meat (specially designed for broilers) contains the ingredients:

1. Ascophyllum nodosum : Algae extract / seaweed
2. Foeniculum Vulgare : Ground Fennel Seed
3. Schisandra Chinensis : Pepperberry / wu wei zi

Ingredient # 1. Ascophyllum nodosum: Algae extract / seaweed
Ascophyllum nodosum (algae extract / seaweed) is known to have positive effects on:
-immune system
-intestinal environment
-feed intake
-metabolism
-resistance
-appetite
-stress
-growth
-endoparasites

• **Ingredient # 1.** - Ascophyllum nodosum - LITERATURE-1 : the positive effects of Ascophyllum nodosum

Antioxidant effects of seaweeds and their active compounds on animal health and production – a review

• Link:

Antioxidant effects of seaweeds and their active compounds on animal health and production – a review - PMC (nih.gov)

Quotes from this scientific research:
'Supplementation of seaweed to an animal diet can boost antioxidant activity, immunity and the gut environment. Nutritional supplementation of seaweed can also improve meat quality through the deposition of marine-derived antioxidant components in muscles.'

'Natural antioxidants used as feed additives can not only improve the health and overall performance of animals, but also increase their resistance to environmental stress, such as heat stress, poor housing conditions, diseases, etc.'

'Marine organisms, for example seaweed - red, brown and green macroalgae, contain an abundance of biologically active substances, including phenolic compounds, polysaccharides, pigments, vitamins, micro and macro elements and proteins known for their antioxidant activity, which can help in maintaining proper redox status in animals and exhibiting pleiotropic effects for enhancing good health and productivity.'

'Seaweed's polysaccharides can improve the composition of animals' gastrointestinal microbiota without interfering with their performance. Also, the use of seaweed in animal feed can boost antioxidant activity, immunity and the intestinal environment.'

'In addition, seaweeds have antimicrobial properties; they played an essential role in reducing the prevalence of enterohemorrhagic E. coli on skin smears and in faecal samples, as well as the growth of Salmonella spp.'

NutroCorp international

Natural products for healthy chickens

'It can be concluded that seaweeds with antioxidants used in feed mainly improve intestinal health and strengthen the function of the immune system.'

Authors:
I. Michalak, R.Tiwari, M. Dhawan, M. Alagawany, M. R. Farag, et al., 2022

Faculty of Chemistry, Department of Advanced Material Technologies, Wrocław University of Science and Technology, Wrocław, Poland

Department of Veterinary Microbiology and Immunology, College of Veterinary Sciences, Uttar Pradesh Pandit Deen Dayal Upadhyaya Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go Anusandhan Sansthan (DUVASU), Mathura, India

Department of Microbiology, Punjab Agricultural University, Ludhiana, India

The Trafford Group of Colleges, Manchester, United Kingdom

Poultry Department, Faculty of Agriculture, Zagazig University, Zagazig, Egypt

Forensic Medicine and Toxicology Department, Veterinary Medicine Faculty, Zagazig University, Zagazig, Egypt

Division of Surgery & Division of Pathology, ICAR-Indian Veterinary Research Institute, Bareilly, Uttar Pradesh, India

Department of Pharmacy, BGC Trust University Bangladesh, Chittagong, Bangladesh

• **Ingredient # 1** - Ascophyllum nodosum - LITERATURE-2 : the positive effects of Ascophyllum nodosum

Effects of brown seaweed products on growth performance, plasma biochemistry, immune response, and antioxidant capacity of broiler chickens challenged with heat stress.

• Link:

Effects of brown seaweed products on growth performance, plasma biochemistry, immune response, and antioxidant capacity of broiler chickens challenged with heat stress - PMC (nih.gov)

Quotes from this scientific research:
'Seaweed contains unique bioactive substances and is used in poultry feed due to its richness in carbo-hydrates, minerals, proteins, vitamins and dietary fiber, with relatively stable amino acid profiles and growth-stimulating properties (Kulshreshtha et al., 2020).'

'Brown seaweeds are exceptional bioactive substances, rich in phenolic compounds (phlorotannin, flavonoids), pigments (chlorophyll, fucoxanthin) and contain a high content of total polysaccharides such as fucoidan, laminarin, alginic acid and mannitol (Holdt and Kraan, 2011; Zheng et al., 2020). They have been reported to exert various biological activities, including an antioxidant, anti-inflammatory and antimicrobial role.'

'Several studies have reported the potential benefits of different types of seaweed in laying hens (Choi et al., 2014; Kulshreshtha et al., 2014; Borzouie et al., 2020), ducks (El-Deek and Brikaa, 2009) and broilers (Abudabos et al., 2013; Mohammadigheisar et al., 2020), in terms of performance, blood parameters and gut health.'

'Brown seaweed (Ascophyllum nodosum) is an exceptional bioactive compound known for its excellent antioxidant properties.'

'Brown seaweed may also enhance the antioxidant defense systems of animals and regulate their inflammatory responses (Ramadan et al., 2020; Michalak et al., 2022).'

'The phenolic compounds in brown seaweed can protect the body against oxidative damage that occurs in response to environmental or nutrient changes (Li et al., 2017) and promote good health and productivity in animals (Michalak et al., 2022). Previous studies showed that dietary supplementation of marine algal polysaccharides extracted from seaweed (E. prolifera) reduced bursal weight, gut and liver antioxidant enzymes (total superoxide dismutase, glutathione, catalase and glutathione peroxidase) and malondialdehyde (MDA) levels of broilers improves.'

'Broilers fed 1 ml and 2 ml SWE (seaweed extract) in drinking water had marginally improved ($P < 0.05$) parameters of growth performance compared to the control.'

'In a study by Kumar (2018), nutritional supplementation of Sargassum wightii (genus of brown seaweed) with 1%, 2%, 3% and 4% improved body weight, feed intake, feed conversion ratio and meat quality of broilers.'

'The growth-promoting effects of brown seaweed that led to the increase in AFI (Average Feed Intake) and BWG (Body Weight Gain) in our study could be attributed to the richness of fiber content (Table 1) and laminarin. There is evidence that dietary fiber can improve digestibility, feed intake and overall growth performance in poultry production (Rezaei et al., 2014; Varastegani and Dahlan, 2014; Nassar et al., 2019). Laminarin interacts with a surface layer of the small intestine to improve nutrient digestibility, positively impacting broiler growth performance (Sweeney et al., 2017).'

NutroCorp international

Natural products for healthy chickens

'In conclusion, nutritional supplementation of brown seaweed improved growth performance of birds regardless of HS (heat stress) and may help to reduce the negative effects of HS by enhancing plasma enzyme activities of heat stressed birds.'

Authors:
F. Akinyemi & D. Adewole, 2022

Department of Animal Science and Aquaculture, Faculty of Agriculture, Dalhousie University, Truro, NS, B2N 5E3, Canada

NutroCorp international
Natural products for healthy chickens

• **Ingredient # 1.** - Ascophyllum nodosum - LITERATURE-3 : the positive effects of Ascophyllum nodosum

Research Note: Effect of a phlorotannin extract of the brown seaweed *Ascophyllum nodosum* as a potential control strategy against *Campylobacter* in broilers

• Link:

Research Note: Effect of a phlorotannin extract of the brown seaweed Ascophyllum nodosum as a potential control strategy against Campylobacter in broilers - ScienceDirect

Quotes from this scientific research:
'The bactericidal effect of phlorotannins from brown algae has been demonstrated before. In particular, Ascophyllum nodosum florotannin exhibits bactericidal activity against Escherichia coli O157:H7 strains (Wang et al., 2009).'

'Efficacy of phlorotannins from the brown alga Ecklonia kurome was demonstrated against Campylobacter (Nagayama et al. 2002).'

Authors:
L. Bonifait, H. Marfaing, A. Leroux, et al., 2022

ANSES, Laboratory of Ploufragan–Plouzané–Niort, Unit of Hygiene and Quality of Poultry and Pork Products, BP53, 22440 Ploufragan, France

CEVA, Algae Technology & Innovation Center, Presqu'île de Pen-Lan, 22610 Pleubian, France

ZOOPOLE Développement – CTPA, 22440 Ploufragan, France

ANSES, Laboratory of Ploufragan–Plouzané–Niort, Department of Poultry Experimentation, BP53, 22440 Ploufragan, France

NutroCorp international
Natural products for healthy chickens

Ingredient # 2. Foeniculum Vulgare Mill.: ground fennel seed:
Fennel (Foeniculum Vulgare Mill.) is known to have positive effects on:
-gut health
-respiratory system
-growth
-digestion
-stable climate

• **Ingredient # 2.** - Foeniculum Vulgare Mill. - LITERATURE-1 : the positive effects of Foeniculum Vulgare Mill

Perspective, Opportunities and Challenges in Using Fennel (*Foeniculum vulgare*) in Poultry Health and Production as an Eco-Friendly Alternative to Antibiotics: A Review

• Link:

Perspective, Opportunities and Challenges in Using Fennel (Foeniculum vulgare) in Poultry Health and Production as an Eco-Friendly Alternative to Antibiotics: A Review - PMC (nih.gov)

Quotes from this scientific research:
'According to studies, fennel seeds have several biological effects in poultry, including improved performance, higher proliferation of immune cells, reduced oxidative stress and increased antibody titers against infectious diseases.'

'The current review concluded that fennel seed supplementation has multiple beneficial effects on poultry growth and health.'

'Numerous studies have previously identified positive effects of fennel seed preparation on chicken health and practical application in poultry production.'

'Complementing chicken feed with fennel seed has been shown to promote poultry health and productivity while protecting against various infectious diseases.'

'The current review focuses on the effects of fennel seed as a poultry feed additive on poultry growth, carcass quality, blood biochemistry, antioxidant activity, immunity and microbiological aspects.'

'Fennel essential oils have extensive antibacterial activity against all the bacteria they examined, especially Gram-positive bacteria.'

'The disc diffusion method findings revealed that Bacillus subtilis and Aspergillus niger were the most sensitive bacteria tested, with the largest zones of inhibition.'

'Fennel essential oils have been reported to inhibit a wide variety of Bacillius species. Fennel essential oils are also active against Aspergillus species, according to Mimica-Dukić et al., 2003. Ghiasvand et al., 2021, reported that fennel essential oil reduced the E. coli population in the gut of broilers.'

Authors:
R.U. Khan, A. Fatima, S. Naz, et al., 2022

NutroCorp international

Natural products for healthy chickens

Faculty of Animal Husbandry and Veterinary Sciences, College of Veterinary Sciences, The University of Agriculture, Peshawar 25130, Pakistan

Department of Poultry Science, Faculty of Animal Husbandry & Veterinary Sciences, The University of Agriculture, Peshawar 25000, Pakistan

Department of Zoology, Government College University, Faisalabad 38000, Pakistan

Department of Agro-Environmental and Territorial Sciences, University of Bari 'Aldo Moro', 70126 Bari, Italy

Department of DETO, Section of Veterinary Science and Animal Production, University of Bari 'Aldo Moro', 70010 Bari, Italy

NutroCorp international

Natural products for healthy chickens

• **Ingredient # 2.** - Foeniculum Vulgare Mill. - LITERATURE-2 : the positive effects of Foeniculum Vulgare Mill.

Effects of dietary fennel (*Foeniculum vulgare* Mill.) seed powder supplementation on growth performance, nutrient digestibility, small intestinal morphology, and carcass traits of broilers

• Link:

Effects of dietary fennel (Foeniculum vulgare Mill.) seed powder supplementation on growth performance, nutrient digestibility, small intestinal morphology, and carcass traits of broilers - PMC (nih.gov)

Quotes from this scientific research:

'Supplementation of livestock and poultry feed with plants containing bioactive components has yielded encouraging results. These additives can promote growth and performance and improve feed efficiency, nutrient digestion, antioxidant status, immunological indicators and poultry health (Dhama et al., 2015; Alagawany et al., 2019).'

'Fennel seed is often used as a natural remedy for digestive disorders such as dyspepsia, bloating and flatulence, and has analgesic, antipyretic and antioxidant properties (El-Deek, Attia & Hannfy, 2003; Choi & Hwang, 2004; Guimarães et al., 2011).'

'Using fennel in poultry feeds improves appetite, digestion, nutrient absorption and immunity, and does not produce drug residues.'

'Mohammed & Abbas (2009) showed that broilers fed feeds containing different levels of fennel seed showed improved weight gain and feed efficiency.'

'In conclusion, dietary supplementation of fennel resulted in a beneficial effect on broiler digestion and absorption capacity, carcass characteristics and gut histological properties, which improved gut morphological development and thus promoted healthy and efficient development in Cobb broilers.'

'In conclusion, dietary supplementation with a moderate concentration of fennel influences carcass performance and gut morphology and promotes growth and development of broilers.'

Authors:

H. Liu, J. Li, S. Lin, et al., 2021

College of Animal Science and Technology, Gansu Agricultural University, Lan Zhou, Gansu, China

NutroCorp international
Natural products for healthy chickens

• **Ingredient # 2.** - Foeniculum Vulgare Mill. - LITERATURE-3 : the positive effects of Foeniculum Vulgare Mill.

Effects of Fennel Seed Powder Supplementation on Growth Performance, Carcass Characteristics, Meat Quality, and Economic Efficiency of Broilers under Thermoneutral and Chronic Heat Stress Conditions

• Link:

Effects of Fennel Seed Powder Supplementation on Growth Performance, Carcass Characteristics, Meat Quality, and Economic Efficiency of Broilers under Thermoneutral and Chronic Heat Stress Conditions - PMC (nih.gov)

Quotes from this scientific research:
'According to the findings of this study, the inclusion of fennel in the diet resulted in a beneficial effect on the growth performance and carcass quality of broilers under heat stress.'

'3.2% fennel seed powder in the diet of broilers increased growth rate under chronic heat stress and reduced redness and temperature of the breast meat, suggesting that 3.2% fennel seed could be used as a means of improving the broiler's tolerance during chronic heat stress (CHS).'

'The chest muscle temperature was significantly influenced by heat stress and/or fennel seed supplementation. The highest value (29.67 °C) was observed in broilers fed the control diet under CHS. In addition, broilers supplemented with 1.6 and 3.2% fennel seed had significantly lower breast temperatures than the unsupplemented control.'

Authors:
A.A. AL-Sagan, S. Khalil, E.O.S. Hussein, et al., 2020

King Abdulaziz City for Science & Technology, P.O. Box 6086, Riyadh 11442, Saudi Arabia

Department of Animal Production, College of Food and Agriculture Sciences, King Saud University, Riyadh 11451, Saudi Arabia

Arid Land Agriculture Department, Faculty of Meteorology, Environment, and Arid Land Agriculture, King Abdulaziz University, Jeddah 21589, Saudi Arabia

Ingredient # 3. Schisandra Chinensis: pepperberry / wu wei zi:
Pepperberry / wu wei zi (Schisandra Chinensis) is known to have positive effects on:
-Newcastle disease
-lymphocyte proliferation
-gut health
-immune system
-inflammations

• **Ingredient # 3.** - Schisandra Chinensis - LITERATURE-1 : the positive effects of Schisandra Chinensis

Progress of studies on plant-derived polysaccharides affecting intestinal barrier function in poultry.

• Link:

Animals | Free Full-Text | Progress of Studies on Plant-Derived Polysaccharides Affecting Intestinal Barrier Function in Poultry (mdpi.com)

Quotes from this scientific research:
'Significantly improved antibody titers against Newcastle disease virus and lymphocyte proliferation in broilers.'

'Recently, plant-derived polysaccharides have been widely used in poultry production, due to their strong hypo-lipidemic, hypoglycemic, antioxidant, antitumor, anticoagulant, anti-inflammatory and immunomodulatory activities.'

'As natural bioactive components, plant-derived polysaccharides have many biological functions, such as anti-inflammatory, antioxidant, anticoccidial and immune regulation, and are widely used in poultry production.'

'In terms of microbial barriers, plant-derived polysaccharides regulated the abundance of beneficial bacteria and harmful bacteria, and could be regulated by the content of short-chain fatty acids. In terms of chemical and physical barriers, plant-derived polysaccharides promoted mucin, digestive enzymes and villus morphology, and reduced intestinal permeability.'

'In terms of the immune barrier, plant-derived polysaccharides upregulated immunoglobulins, cytokines and cellular mediators in the intestinal tract, and regulated them through the corresponding signaling pathways.'

Authors:
S. Guo, Y. Xing, Y. Xu, et al., 2022

College of Animal Science, Inner Mongolia Agricultural University, Hohhot 010018, China

NutroCorp international
Natural products for healthy chickens

• **Ingredient # 3.** - **Schisandra Chinensis** - LITERATURE-2 : the positive effects of Schisandra Chinensis

Schizandrin attenuates lung lesions induced by Avian pathogenic Escherichia coli in chickens.

• Link:

Schizandrin attenuates lung lesions induced by Avian pathogenic Escherichia coli in chickens - ScienceDirect

Quotes from this scientific research:
'Bird pathogenic Escherichia coli (APEC) can cause serious pathological changes and inflammation in chickens.'

'Schizandrin has an anti-inflammatory effect and can prevent damage to various tissues and organs.'

'Our findings showed that schizandrin significantly inhibited pathological changes, pulmonary edema, MPO activity and MDA content. In addition, schizandrin significantly reduced the levels of TNF-α, IL-1β, IL-6 and IL-8 in lung tissue.'

'Importantly, the mechanism responsible for these effects was attributed to the inhibitory effect of schizandrin on NF-κB and MAPK signaling activation.'

'At the infective dose used (1.8 × 109 CFU inoculated intraperitoneally), we found that APEC was detected in spleen tissue, heart tissue, liver tissue and lung tissue, and after treatment with schizandrin, the number of colonies of homogenate in each tissue was significantly lower than that of the APEC group.'

'In conclusion, our findings show that schizandrin exhibits antioxidant and anti-inflammatory activity against APEC-induced lung lesions in chickens, paving the way for a rational use of schizandrin as a protective agent against lung-related inflammatory diseases.'

Authors:
M. Yuan, L.-Y. Peng, O. Wei, et al., 2020

College of Veterinary Medicine, Jilin University, No. 5333 Xi'an Road, Changchun, Jilin, 130062, China

Department of Heart Disease, Affiliated Hospital to Changchun University of Chinese Medicine, Changchun, Jilin, 130062, China

NutroCorp international

Natural products for healthy chickens

• **Ingredient # 3.** - **Schisandra Chinensis** - LITERATURE-3 : the positive effects of Schisandra Chinensis

Influence of supplemental *Schisandra chinensis* powder on growth performance, serum cholesterol, and meat quality of broilers.

• Link:

Influence of supplemental Schisandra chinensis powder on growth performance, serum cholesterol, and meat quality of broilers: Acta Agriculturae Scandinavica, Section A — Animal Science: Vol 63, No 4 (tandfonline.com)

Quotes from this scientific research:
'Compared to other treatments, increasing levels of S. chinensis caused reductions in liver and abdominal fat weights, total cholesterol and low-density lipoprotein (LDL) cholesterol levels or pH, thiobarbituric acid reactive substances (TBARSs) and L* (lightness) values.'

'Total phenol, 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging, and a* (redness) levels were increased by treatments with increasing levels of S. chinensis. Diets containing 1% or 2% S. chinensis lead to a greater decrease in serum cholesterol and improvements in the physico-chemical properties and meat color stability of broilers.'

Authors:
Y.J. Kim, T.H. Chung & I.H. Choi, 2013

Division of Life Resources, Daegu University, Gyong San, South Korea

Department of Companion Animal and Animal Resources Sciences, Joongbu University, Geumsan-gun, South Korea