THORNE VET

SUPERIOR IMMUNE SUPPORT FROM 21 ACTIVE INGREDIENTS

- 7 Vitamins
- 3 Minerals
- 7 Botanical Extracts
- 2 Amino Acids
- 2 Nutrients with unique immune supportive properties

Immune Support Formula

Formerly Immugen

Comprehensive immune support for dogs and cats

Small companion animals can face numerous immune system challenges, especially when they are either very young or older. Immune Support Formula provides vitamins, minerals, amino acids, botanicals, a glandular ingredient, and Coenzyme Q10 to optimize a companion animal's immune system function.

Immune Support Formula also supports the health of muscles and joints, assists in healing, and assists mobility in active and aging animals.

Key Immune Support Features

- A unique blend of immuno-protective ingredients
- Vitamins, minerals, glandular, and botanicals with immune-supportive properties
- Proliferates and activates B cells, T cells, and natural-killer cells
- Promotes both the animal's innate resistance and adaptive resistance to pathogens

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Immune Support Formula – Special Ingredients

Vitamin A and Vitamin C

Vitamin A is provided as **Vitamin A Palmitate** and **Beta-Carotene** to achieve the same benefits of these two carotenoids, while eliminating the risk that too much **Vitamin A** might accumulate in the animal's liver. **Vitamin A** enhances the body's immune response by promoting the formation of epithelium, the lining of all outer surfaces and most inner surfaces of the body that function as the "front line" of defense against pathogen invasion. **Vitamin A** is involved in the optimal development of the immune system – both innate immunity and adaptive immunity. Studies show an association between **Vitamin A** and enhanced immune cell function. **Vitamin A** possesses immune-supportive activities by enhancing the production of lymphocytes – B cells, T cells, and natural-killer cells. In addition, **Vitamin A** stimulates the production of several beneficial cytokines. **Vitamin A** also stimulates phagocytosis (the ability of beneficial phagocytes to engulf and consume foreign substances) and the bacteria-killing ability of neutrophils and macrophages. Also of benefit, **Vitamin A** plays a crucial role in supporting immune tolerance of the mucosal gut barrier, which means **Vitamin A** supports an animal's ability to consume a wide range of different foods and not react adversely to them.

Vitamin C (as **Ascorbic Acid**) is well known for its role in supporting a healthy immune system. Just like humans, companion animals can't make **Vitamin C**, so it must come from the foods they eat or from supplementation. **Vitamin C** contributes to immune defense by supporting functions of both the innate immune system and the adaptive immune system. **Vitamin C** accumulates in phagocytic cells, which enhances phagocytosis, and it generates reactive oxygen species that kill pathogenic microbes.

Vitamin B6, Vitamin B12, and Folate

Both humans and animals need **Vitamin B6** (as **Pyridoxal 5'-Phosphate**) to make important cells of the immune system, particularly cytokines and T-lymphocytes. **Folate** (as **L-5-MTHF**) and **Vitamin B12** (as **Methylcobalamin**) play a crucial role in a healthy balanced immune system. Adequate levels of **Folate** and **Vitamin B12** enhance the activity of immune cells and support multiple metabolic processes, especially methylation, because inefficient methylation can lead to systemic inflammation that can contribute to the pathogenesis of many diseases.

Vitamin E

Vitamin E (as **d-alpha tocopheryl**) – a potent antioxidant found in higher concentration in immune cells compared to other cells – is one of the most effective nutrients for supporting immune function. The mechanisms responsible for **Vitamin E's** beneficial effects on the immune system have been explored in cell-based, pre-clinical, and clinical intervention studies. Most notably, **Vitamin E** supports the growth, activity, and function of T cells – T cells are the white blood cells that find and destroy infected cells. **Vitamin E** does this directly by enhancing T cell membrane integrity and signal transduction (the process by which a cell responds to invading substances outside the cell through signaling molecules found on the surface of the cell), as well as indirectly by beneficially affecting inflammatory mediators generated from other immune cells.

Maitake mushroom, Reishi mushroom, and Cordyceps mushroom

Maitake (Grifola frondosa) mushroom extract – "**Maitake**" means "**dancing mushroom**" in Japanese – it's said **Maitake** got its name because people danced with happiness on finding it in the wild because of its healing properties. Medicinal mushrooms contain powerful polysaccharides called beta-glucans, which help balance both the inflammatory response and immune function. Beta-glucans attach to receptor sites on immune cells and activate these sites, which better enables immune cells to recognize pathogenic cells as "foreign" and create a higher level of immune response. The beta-glucan fraction in **Maitake** has a strong beneficial effect on the immune system – it boosts production of lymphokines (protein mediators) and interleukins (secreted proteins) that improve immune response. **Maitake** has long been used in both Japanese and Traditional Chinese Medicine, and much scientific evidence substantiates that **Maitake** does support the immune system. For example, one study found that when mice consumed Maitake in supplement form for two weeks, there was a significant stimulation of immune defense reaction.

Reishi (**Ganoderma lucidum**) mushroom extract stimulates the beneficial activity of B cells, T cells, macrophages, and natural killer cells, the major cellular components of the body's adaptive immune response, which explains **Reishi's** traditional use in immune stimulation and down-regulating multiple inflammatory messenger molecules.

Cordyceps (**Cordyceps sinensis**) mushroom extract has beneficial effects on both innate immunity and adaptive immunity. **Cordyceps** improves immune function by beneficially stimulating cells and chemicals in the immune system. When cells are exposed to **Cordyceps**, proteins that increase inflammation in the body become suppressed; for example, **Cordyceps** down-regulates pro-inflammatory cytokines. The primary immune-supportive compounds in **Cordyceps** are adenosine and cordycepin. These bioactive constituents promote the production of the beneficial interleukin cytokines and tumor necrosis factor alpha, as well as stimulation of the phagocytosis activity of immune cells. The immune-supportive activity of **Cordyceps** also increases signal transduction between immune cells and the activity of antigens. These same constituents restrain nuclear factor kappa B activity, thus down-regulating an important pro-inflammatory pathway. **Cordyceps** increases the beneficial activity of natural killer cells and macrophages. Furthermore, **Cordyceps** has a positive effect on the gut's immune system, which further benefits systemic immune function.

Astragalus, Eleuthero, Ashwagandha, and Licorice

Astragalus extract (**root**) (**Astragalus membranaceus**) has a long history of use in balancing immune function and down-regulating the inflammatory response. **Astragalus** does this by stimulating the activity of helper T cells and interferon gamma, and by down-regulating the activity of harmful inflammatory messenger molecules, like nuclear factor kappa B.

Eleuthero extract (**root**) (**Eleutherococcus senticosus**), also known as **Siberian ginseng**, has been used for centuries in China and Russia. Despite its name, **Eleuthero** is completely different from American ginseng (Panax quinquefolius) and Asian ginseng (Panax ginseng), and **Eleuthero** has different active chemical components. Natural healers have used **Eleuthero** for thousands of years to support immune function. The active ingredients in **Eleuthero** that benefit immune function are called eleutherosides. **Eleuthero's** immune-supportive activity derives from its ability to maintain a healthy level of T4 lymphocytes, specific immune cells that are otherwise suppressed during a viral or bacterial infection. One study found that healthy people who took **Eleuthero** for four weeks had more T cells, indicating more robust immune function. In addition to enhancing immune function, **Eleuthero** can weaken pathogens that make their way into the body. Researchers measuring the anti-viral activity of **Eleuthero** showed that it inhibits virus cell replication in cell cultures. **Eleuthero** also exhibits strong antioxidant activity, which helps speed up recovery after an infection. In one study, participants in the **Eleuthero** group recovered significantly faster and experienced less severe symptoms than the participants who didn't take **Eleuthero**. **Eleuthero** is also an adaptogen, which means it helps the animal adapt to stress by supporting adrenal function.

Ashwagandha extract (**root**) (**Withania somnifera**), also known as **Indian Winter Cherry**, has been used extensively in traditional Ayurvedic medicine in India for 3,000 years. **Ashwagandha** has excellent immune-supportive activity, primarily by promoting the disease-fighting immune cells and anti-inflammatory substances that ward off an infection. **Ashwagandha's** immune-supportive activity is due primarily to the withanolides (naturally occurring steroids) in the root that contain antioxidant and anti-inflammatory properties. In addition, **Ashwagandha** contains **glycoprotein**, a protein with potent antimicrobial activity; i.e., **glycoprotein** kills microorganisms before they spread in the body. Studies show **Ashwagandha** increases the activity of natural killer cells (immune cells that fight infection). In a randomized, double-blind, placebo-controlled study, researchers found significant activation of the innate immune system – B cells, T cells, and natural killer cells – as well as adaptive immunity, which the body initiates during an acute immune challenge. **Ashwagandha** also stimulates the immune system by up-regulating the body's production of **superoxide dismutase** and **glutathione peroxidase**, two powerful antioxidants.

Licorice extract (**root**) (**Glychrrhiza glabra**) is a well-known botanical that has been used in Traditional Chinese Medicine for centuries. In China, **Licorice** is called "gancao" (meaning "**sweet grass**"). The roots and rhizomes are the medicinal parts of **Licorice**. **Licorice extract** contains more than 20 triterpenoids and 300 flavonoids. Among **Licorice's** components, 73 bioactive components have been identified. Among them, the triterpenoids **glycyrrhizin** and **glycyrrhetinic acid** are the active components that studies have identified as responsible for **Licorice's** antiviral and antibacterial activity. The mechanisms of action for the virus-suppressing activity of **glycyrrhizin** and **glycyrrhetinic acid** are that they inhibit virus gene expression and replication, thus reducing the ability of viral pathogens to bind to the host's DNA. These two triterpenoids also enhance the animal's immune-supportive functions by activating the proliferation of T cells and blocking the degradation of nuclear factor kappa B. Many studies show **Licorice extract** inhibits the activities of multiple strains of bacteria. And the flavonoids in **Licorice** are well known for their beneficial immune-supportive effects attributed to their antioxidant and anti-inflammatory properties.

Selenium, Zinc, and Manganese

Selenium (as **L-Selenomethionine**) plays an important role in the health of the immune system. Adequate **Selenium** is essential because **Selenium** beneficially influences both the innate immune system and the adaptive immune system. Increased blood levels of **Selenium** are associated with enhanced immune response. For example, **Selenium** promotes the proliferation of T helper cells and B cells, as well as the production of antibodies, in response to bacterial and viral infections, and the beneficial activity of macrophages is impaired when enough **Selenium** isn't present. And, as an antioxidant, **Selenium** lowers oxidative stress, which reduces inflammation and enhances immunity. It is thought that **Selenium** augments the cellular immune response through an increased production of beneficial interferons and other cytokines.

Zinc (as **Zinc Picolinate**) promotes adaptive immunity and macrophage function. Numerous studies show a deficiency of **Zinc** adversely affects immune function, while supplementation helps restore normal immune activity. **Zinc** affects multiple aspects of the immune system. For example, **Zinc** is crucial for the normal development and function of the cells that mediate innate immunity, neutrophils, and natural-killer cells. Macrophage activity is inhibited by a **Zinc** deficiency, as is phagocytosis. The presence of **Zinc** benefits the proliferation and function of T cells and B cells. In addition, **Zinc's** ability to function as an antioxidant and stabilize membranes suggests **Zinc** plays a role in preventing free radical-induced injury during inflammatory processes.

Manganese (as **Manganese Bisglycinate**) is an essential cofactor in the production of superoxide dismutase, a key enzyme involved in immune function and protecting cell membranes from oxidative damage. With regard to immune cell function, a **Manganese** deficiency can impair antibody production. The ability to acquire **Manganese** during a bacterial infection is essential in animals because **Manganese** is an essential micronutrient for the growth of bacterial pathogens during an infection. To help ward off an infection, the animal naturally limits **Manganese** availability to invading bacteria through an active process known as nutritional immunity. To overcome this limitation, bacteria produce high-affinity **Manganese** uptake systems to scavenge this nutrient from the host's tissues. Therefore, having a sufficient bodily store of **Manganese** to help fight off a bacterial infection is keenly important. **Manganese Bisglycinate** is a fully reacted mineral chelate that exhibits optimal absorbability.

Glutamine, Dimethylglycine

Glutamine (as **L-Glutamine**) is the most abundant and versatile amino acid in the body. **Glutamine** is found in high concentration in the animal's gastrointestinal tract, which is its greatest user. Evidence suggests **Glutamine** helps maintain immune health by promoting the beneficial immune functions of the animal's gut. In a disease state, **Glutamine** is utilized at a rapid rate by the cells of the immune system because **Glutamine** is required to support optimal proliferation of lymphocytes, the production of cytokines by the lymphocytes, the phagocytic activity of macrophages, and the killing of bacteria by neutrophils. The positive activity of macrophage-mediated phagocytosis (the engulfing and destroying of harmful cells by healthy cells) is beneficially influenced by the availability of **Glutamine**. During an infection, a low **Glutamine** level can occur because of the increased demand for **Glutamine** by the liver, kidney, gut, and immune system, thus exceeding the supply of **Glutamine** from the diet and tissues. Animal studies show that including **Glutamine** in the diet increases survival to a bacterial challenge.

Dimethylglycine, a derivative of the amino acid glycine, derives its immune-supportive activity from its ability to beneficially increase the production and activity of lymphocytes. For example, in an animal study, animals inoculated with a dead flu virus and then fed **Dimethylglycine** showed a beneficial 10-fold increase in the production of lymphocytes. And a human study showed a 4-fold positive increase in antibody response to a pneumococcal vaccine in subjects receiving **Dimethylglycine**. No toxicity or adverse effects were observed during these studies. These results suggest that **Dimethylglycine** enhances beneficial immune responses in animals and humans. Because the natural amount of **Dimethylglycine** decreases as an animal grows older, it can increase susceptibility to stress and infection. In addition, **Dimethylglycine** donates methyl groups for the recycling of **SAMe**, the major methyl donor in an animal's body, thus supplying methyl groups for the detoxification processes of many bodily constituents like neurotransmitters, hormones, and vitamins. In particular, **Dimethylglycine** supports the production of intracellular **Glutathione**. **Dimethylglycine** works best in combination with other vitamins, minerals, and amino acids to stimulate metabolism. Several ingredients in **Immune Support Formula** – **Vitamin B6**, **Vitamin B12, and Folate** – synergistically enhance the activity of **Dimethylglycine**. **Dimethylglycine** also supports immune function in dogs and cats by helping the animal cope with various forms of stress.

Thymus Extract

Just like in humans, an animal's **Thymus** gland fulfills several key purposes. The **Thymus** gland is responsible for producing and releasing the hormone thymosin. The **thymosin** in **Thymus extract** helps stimulate the production of T cells, the white blood cells in the immune system that function by traveling to the animal's lymph nodes where they help ward off infection.

Coenzyme Q10

Coenzyme Q10 has multiple characteristics that benefit immune function. First, **CoQ10** helps cells produce energy by acting as an electron carrier within the mitochondria, the cell's powerhouse, enabling a continuous supply of electrons for producing cellular energy. An animal's immune response has intensive cellular energy requirements because the tissues and cells involved in immune function are highly energy dependent. Thus, **CoQ10** plays a significant role in supporting immune function by supplying an optimal amount of cellular energy. Second, **CoQ10** functions as an antioxidant by protecting cellular membranes against free radical-induced oxidation. In addition, because immuno-protective phagocytic cells destroy invading pathogens by producing their own free radicals, the antioxidant action of **CoQ10** protects these beneficial phagocytic cells from self-destruction caused by their self-generation of free radicals. Third, **CoQ10** has an anti-inflammatory role in immune response because of its ability to down-regulate the release of pro-inflammatory cytokines. And fourth, **CoQ10** plays an important energy-producing and pH-maintenance function within lysosomes, the part of the cell that breaks down and digests invading pathogenic organisms.

Immune Support Formula

Comprehensive Immune Support for Dogs and Cats

1/2 soft chew daily

1 soft chew per 25 pounds of body weight daily

V943-SC / 90 Soft Chews

PRODUCT FACTS

Active Ingredients per 3.5-gram soft chew:	
L-Glutamine	200 mg
Ascorbic Acid (Vitamin C)	175 mg
Dimethylglycine	70 mg
Ashwagandha Extract (root) *(Withania somnifera)*	60 mg
Reishi Mushroom (*Ganoderma lucidum*)	50 mg
Maitake Mushroom *(Grifola frondosa)*	50 mg
Cordyceps Mushroom *(Cordyceps sinensis)*	50 mg
Eleuthero Extract (root) *(Eleutherococcus senticosus)*	50 mg
d-Alpha Tocopheryl (Vitamin E) (35 IU)	30 mg
Thymus (Bovine)	25 mg
Coenzyme Q10	20 mg
Licorice Extract (root) *(Glychrrhiza glabra)*	20 mg
Astragalus Extract (root) (*Astragalus membranaceus*)	10 mg
Pyridoxal 5'-Phosphate (Vitamin B6)	7 mg
Zinc (Picolinate)	5 mg
Beta-Carotene (1,400 IU)	840 mcg
Vitamin A Palmitate (1,400 IU)	770 mcg
Folate (L-5-Methyltetrahydrofolic Acid, Glucosamine Salt)	200 mcg
Manganese (Bisglycinate)	175 mcg
Methylcobalamin (Vitamin B12)	100 mcg
Selenium (L-Selenomethionine)	7 mcg

Inactive Ingredients (soft chew matrix):
Arabic gum, buffered white distilled vinegar, chick pea flour, chicory root, citric acid, coconut glycerin, coconut oil, guar gum, natural hickory smoke flavor, rosemary extract, sunflower lecithin, sunflower oil, tapioca starch.

GLUTEN FREE

THORNEVET