

BioRadiant® – canine skin and coat formula

Icelandic Kelp (*Ascophyllum nodosum*) brown Fucus seaweed is a rich source of iodine and calcium as well as a good source of iron, phosphorus, potassium, magnesium, zinc, vitamins A, D, E, K and B complex. The main constituents of kelp are mucopolysaccharides, algin, phenolic compounds and polar lipids as well as protein, carbohydrates and essential fatty acids (Wurges & Frey, 2005). These components work together to promote the overall health of the skin and coat (Turner, J. L. et al., 2002) (Wolf, 2017). Kelp also plays an essential role in the necessary regulation of iodine as iodine deficiency can result in alopecia and dry, sparse hair while too much iodine leads to flaky, irritated skin (National Research Council, 2006). Due to the nutrient composition of ocean waters surrounding Iceland, Icelandic Kelp has one of the highest concentrations of essential minerals, iodine, and vitamins of all kelp varieties. Kelp harvested from Iceland is also considered to be less contaminated by toxins and heavy metals since the waters are protected, clean and pristine in comparison to water environments where other varieties of kelp are found (Wolf, 2017).

Fish oil contains essential omega-3 fatty acids EPA and DHA which have been shown to improve skin and coat health by reducing inflammation in the skin through regulation of inflammatory mediators (Rees et al., 2001) (Watson, 1998). These fatty acids also work as conditioning agents to improve the softness and luster of the coat (Kirby et al., 2009) (Bauer, 2007). Omega 3's can also effectively manage symptoms associated with pruritic skin conditions (Kirby et al., 2009) (Logas & Kunkle, 1994). Choosing the correct source of DHA is crucial as its full range of health benefits are realized as not all omega-3s are equal (Doughman et al., 2007). A preformed source of DHA, gold such as microalgae makes sure that the DHA is taken directly from the source and is consistent, sustainable and free of ocean-borne contaminants (Lenihan-Geels et al., 2013) (Ward & Singh, 2005).

Curcumin found in turmeric (turmeric extract 95% curcumin) has been shown to play a vital role in skin barrier function, inflammation and pain associated with inflammation (Bose S et al., 2015) (Bensignor et al., 2008). This is due to its immunoglobulin production regulating activity which blocks the release of cells that cause inflammation as well as regulates T cells (Bose S et al., 2015) (Jageta GC, 2007). These mechanisms have been shown to be useful in treating inflammation associated with secondary infection such as eczema (Markwell & Fray, 2014).

Deficiencies in the gut often manifest themselves in the skin and coat of animals and can appear in the form of dermatosis, skin flaking, itchiness, dandruff and general dryness (Young et al., 2010). Ensuring proper absorption of essential nutrients and minerals can significantly improve a pet's skin and coat condition. **Organic inulin prebiotic** promotes the growth of *Bifidobacteria* and *Lactobacilli* in the gastrointestinal tract (Wang & Gibson, 1993) (Young et al., 2010). Increasing the concentrations of these good bacteria improves the absorption of essential nutrients for the maintenance of skin and coat as well as promotes better microflora balance on the skin of the pet (Cummings et al., 2001) (Beloshapka et al., 2012). Furthermore, these good bacteria produce short-chain fatty acids which regulate the beneficial effect of dietary fiber and help to prevent the colonization of pathogenic bacteria in the gut (Flamm et al., 2001) (Flickinger et al., 2003). In this way, working from the inside out, the functioning and appearance of the skin and coat is improved.

Coconut (*Cocos nucifera*) is rich in antioxidants and has antiviral, antifungal and antibacterial properties. It also contains lauric acid that improves skin condition by fighting potential infections, bacteria, and fungi (DebMandala & Mandal, 2011). The primary fat in coconut oil which makes up roughly 62%-65% is MTC oleic acid (medium chain triglyceride) which helps strengthen and condition skin and coat while also adding shine (Rele & Mohile, 2003) (Agero & Verallo-Rowell, 2004). Additionally, the high concentration of MTC in coconut oil has been shown to be effective in treating symptoms of dandruff (Sharma & Joshi, 2004) (Krishna et al., 2010).

Biotin is a water-soluble essential B vitamin that plays an essential role in maintaining healthy skin and coat (Watson, 1998) (Goldberg & Lenzy, 2010). This is because biotin is an essential cofactor for enzymes that catalyze the formation of keratinized tissues (skin, hair, and claws) (Maynard et al., 1979). Furthermore, many of the enzymes directly involved in the synthesis of long-chain fatty acids used for the keratinization process are biotin-dependent (Meyer et al., 1998) (Weiss & Zimmerly, 2000). Increasing the formation of keratin promotes the growth rate of healthy hair follicles as well as fortifies claws/nails (Neuber, 2009). Biotin has been shown to be effective in treating skin conditions such as dry, flaky skin, dull or thinning coat and excessive shedding at a cellular level (Frigg et al., 1989) (Goldberg & Lenzy, 2010).

Carrot (*Daucus carota* subsp. *sativus*) contains a high quantity of alpha and beta-carotene as well as being an excellent source of vitamin K and vitamin B6. Alpha and beta-carotenes are partially metabolized into Vitamin A with fat from the diet (Olson, 1989). Vitamin A has been shown to be beneficial to skin and coat by managing symptoms of dermatosis as well as being critical to the health of rapidly dividing skin cells and hair follicles (Watson, 1998). Carrot also has been shown to be a good source of free biotin which helps support skin and coat health (Hoppner et al., 1994) (Wilson & Lorenz, 1979). Free biotin commonly found in plants is more immediately bioavailable in comparison to protein-bound biotin which is mostly found in bacteria and animal cells. This is because free biotin does not require the body to break a protein-biotin bond making it more easily absorbed and utilized in the body (Alban, 2011).

Zinc is an essential mineral that is fundamental to many aspects of cellular metabolism, some of which are concerned with the maintenance of healthy coat and skin (Watson, 1998) (Kane et al., 1981). In particular, Zinc helps to modulate keratinogenesis, skin functions and wound healing (Colombini, 1999). Zinc also works alongside Biotin to manage symptoms associated with canine dermatosis including alopecia, scales and crusts and dry, dull coat as well as increasing coat gloss (Marsh et al., 2000) (White et al., 2001) (Kane et al., 1981).

The formulation is finished with whole food actives containing sweet potato and anise. These ingredients have health-benefiting properties of their own. Sweet potatoes are an excellent source of dietary fiber containing vitamin A, vitamin C, manganese, phosphorus and vitamin B6. Anise seeds are an important source of minerals including calcium, iron, copper, and zinc as well as many essential b-complex vitamins such as pyridoxine, niacin, and thiamin.

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