paw®
PURE ANIMAL WELLBEING
By BLACKMORES

JOINT HEALTH

Osteoarthritis in Dogs & Cats

2024 edition for professional reference only

OSTEOARTHRITIS IN DOGS AND CATS[1]

Osteoarthritis (OA), also referred to as degenerative joint disease (DJD), is the most commonly diagnosed joint condition in both human and veterinary medicine. It is typically characterised by progressive degeneration and remodelling of synovial joints, leading to joint discomfort and impaired function.

Osteoarthritis is a multifactorial disease with a strong genetic component, and can be exacerbated by lifestyle choices that impact body condition, such as diet and exercise.

1 IN 5 ADULT DOGS SUFFER FROM OSTEOARTHRITIS[1]

61% of cats 6 years and older have OA in at least one joint[3]

80% of dogs over **8 years** of age have osteoarthritis[1]

PREDISPOSITION AND RISK FACTORS FOR OSTEOARTHRITIS[1,4]

Genetics[1]

Certain breeds are predisposed to OA as a result of both conformation related to breed standards, and genetic/heritability components, increasing the likelihood of the development of joint disease.

Conformation[1]

Conformational defects and inherited disorders relating to body, leg size, and joint angles make some breeds especially predisposed to developing OA.

Impact and injuries[4]

Impact loads are the most likely to result in injury to articular cartilage. Furthermore, exercise such as running can lead to arthritic changes in an injured joint.

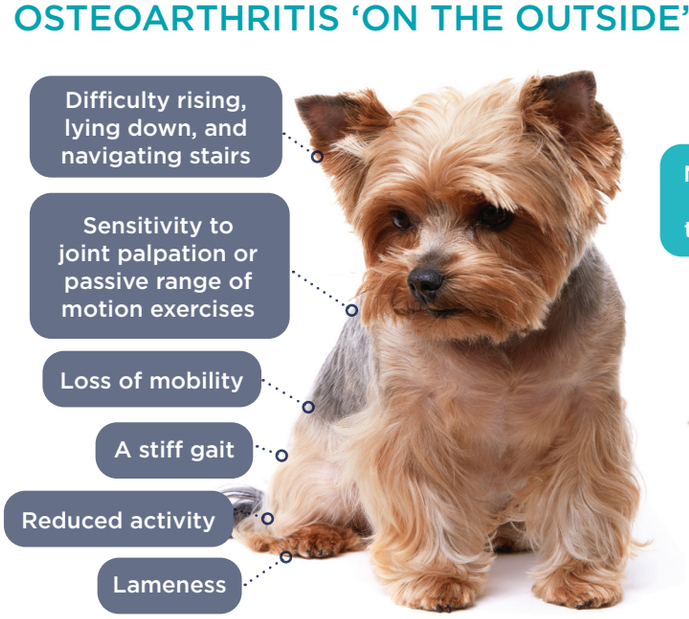
Age

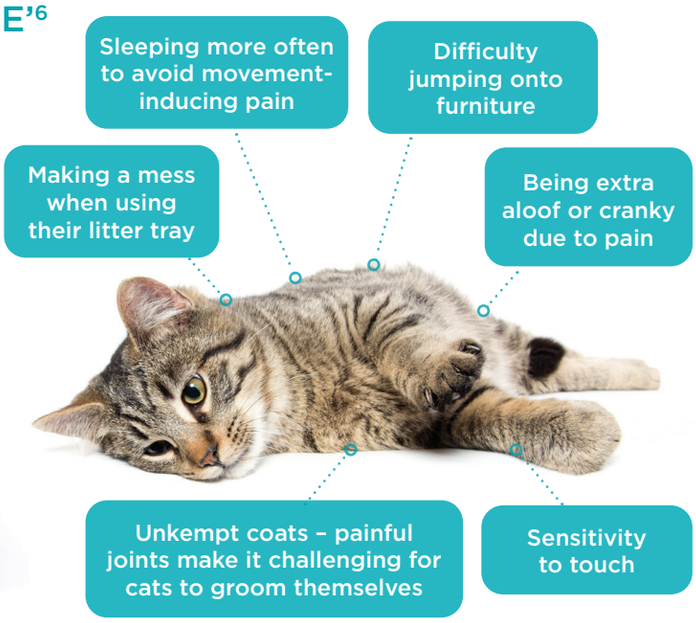
Joint deterioration occurs increasingly with age, and therefore, the prevalence of OA is higher in senior dogs and cats.

Weight[1]

Larger breed, and overweight dogs and cats are heavier in body weight, leading to an increased load on weight-bearing joints.

OSTEOARTHRITIS 'ON THE OUTSIDE'[6]



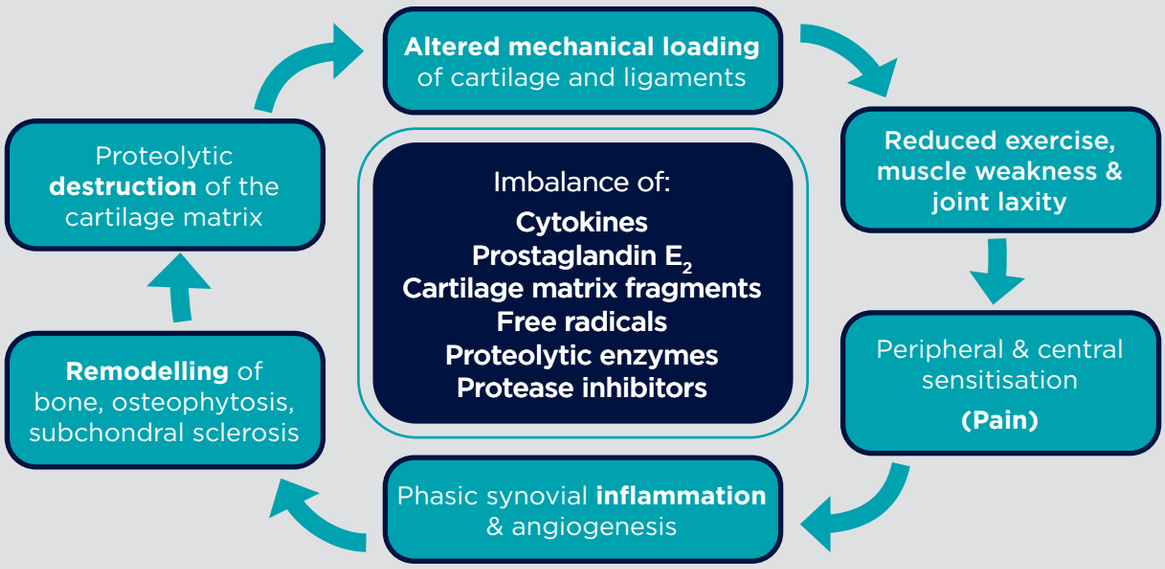


THE VICIOUS CYCLE OF OSTEOARTHRITIS

Both inflammatory and immune processes impact the development and progression of osteoarthritis. Osteoarthritis results from failure of chondrocytes to maintain homeostasis between synthesis and degradation of the extracellular matrix (ECM) components.[7]

Activated synoviocytes and chondrocytes release inflammatory cytokines, which upregulate genes involved in cartilage degradation. These cytokines also impair the innate ability for chondrocytes to restore the ECM, leading to further destruction.[7]

The inflammatory and immune processes perpetuate each other, leading to a vicious cycle of osteoarthritis progression, and thus increasing the complexity of management.[8]



OSTEOARTHRITIS 'ON THE INSIDE'

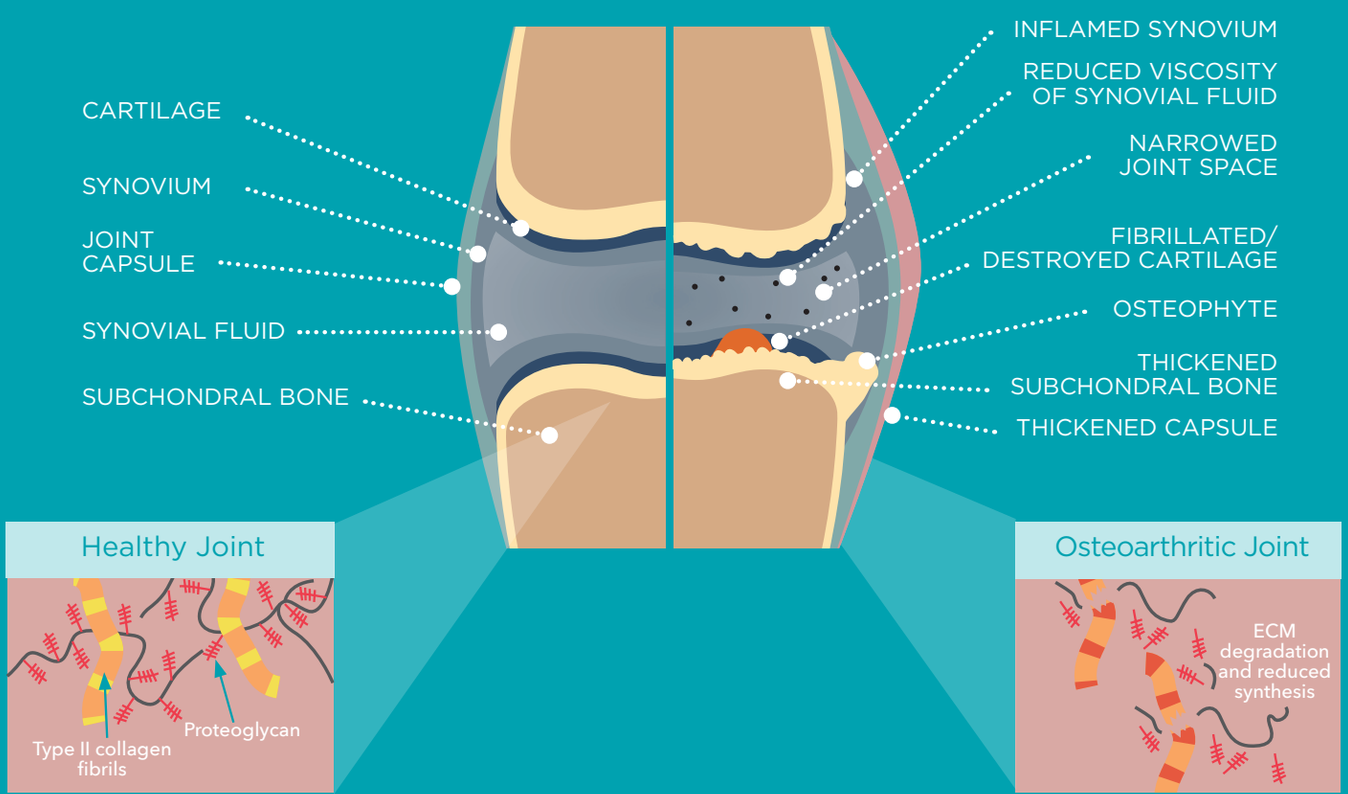


Figure 1. Cross section of a healthy joint (left) compared to an arthritic joint (right), demonstrating the physical changes that occur during joint degradation.

SUPPORTING OSTEOARTHRITIC PATIENTS WITH NUTRACEUTICALS

Once diagnosed, the management of OA in pets is a lifetime commitment, involving a multimodal approach. The aim of long-term management is to control clinical signs by reducing pain, along with improving mobility and hence quality of life; whilst preventing further cartilage degradation.[12]

OA management therefore requires the long-term use of safe therapies, whilst the absence of any cure reinforces the importance of prevention.

Safe long-term prevention and alternative solutions can come from dietary supplements, as they have the advantage of having few or no known side effects.[12]

Nutraceutical and pharmaceutical agents used to treat OA are subdivided into those that aid in alleviating the clinical symptoms, and those aimed at modifying the structure of the joint. [11]

WHY USE NUTRACEUTICALS PERIOPERATIVELY?

Surgery represents the gold standard for injury stabilisation, and for restoration of joint function in the unfortunate case of a cranial cruciate ligament rupture. However, as per other orthopaedic surgeries, a tibial plateau leveling osteotomy (TPLO) neither reduces, nor halts the progression of osteoarthritis.[22] As such, multimodal therapy involving joint nutraceuticals is vital to target secondary osteoarthritis, commencing pre-operatively to optimise preventative therapy. [22]

Ideally, peri-operative supplements should provide chondroprotectives such as glucosamine and chondroitin, which contribute to cartilage formation and repair. Ingredients that target inflammatory responses, and oxidative stress of joint tissues for an enhanced clinical outcome are also of vital importance.[22,23] Shifting the focus to proactive pain management is imperative given the potential for orthopaedic surgery to result in moderate to severe pain. As such, both the AAHA (American Animal Hospital Association) Pain Management guidelines, and the WSAVA Global Pain Management Guidelines recommend the dietary supplementation of omega-3 fatty acids prior to, and after surgery.[38, 39]

NUTRACEUTICALS FOR OA MANAGEMENT

STRUCTURAL SUPPORT

Agents that are capable of delaying, stabilising or even repairing osteoarthritic lesions.[11,13]

- GLUCOSAMINE
- CHONDROITIN

ANTI- INFLAMMATORY & ANALGESIC SUPPORT

Agents that help to alleviate the clinical signs of OA.[11,13]

- FISH OIL
- GREEN LIPPED MUSSEL

ADJUNCTIVE HERBAL SUPPORT

Herbs shown to have clinical efficacy when integrated into management plans.[14]

- CURCUMIN
- BOSWELLIA

THE ACTIONS OF NATURAL INGREDIENTS ON THE INFLAMMATORY PATHWAYS

When used in combination, natural ingredients have been found to block a wide array of inflammatory mediators.

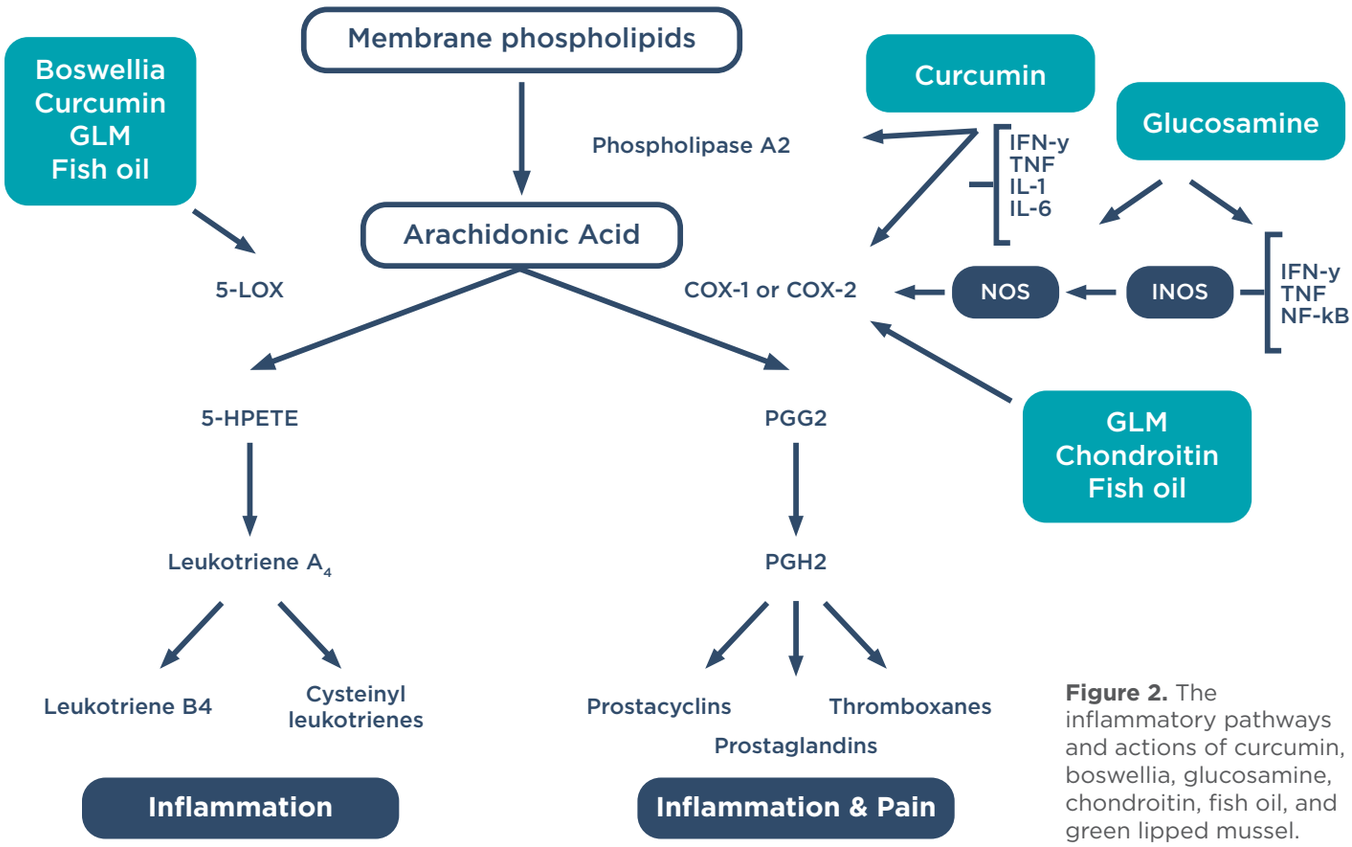


Figure 2. The inflammatory pathways and actions of curcumin, boswellia, glucosamine, chondroitin, fish oil, and green lipped mussel.

The low-down on LOX and leukotrienes with NSAID use[15,16]

Whilst non-steroidal anti-inflammatory drugs (NSAIDs) have been proven to provide effective pain relief for OA, their use is often associated with side effects such as gastrointestinal and renal toxicity, which is a cause of concern for veterinarians and pet owners alike.[15,39] NSAIDs are the competitive inhibitors of COX, the enzyme which mediates the bioconversion of arachidonic acid to inflammatory prostaglandins. As only the COX pathway is inhibited, leukotriene production can become upregulated due to the arachidonate diverting through the 5-LOX pathway.[16]

STRUCTURAL SUPPORT

GLUCOSAMINE AND CHONDROITIN

Chondroprotectives like glucosamine and chondroitin sulphate (CS) are essential components of cartilage metabolism and stimulate important cartilage regenerative processes, thereby adjusting the imbalance of catabolic and anabolic processes in osteoarthritis.[17]

Glucosamine

Glucosamine is a precursor of glycosaminoglycans (GAGs); a vital building block of the extracellular cartilage matrix.[18] Glucosamine can delay cartilage degeneration in OA by:[18]

- Reducing proteoglycan degradation
- Inhibiting the synthesis and activity of degradative enzymes and inflammatory mediators
- Stimulating GAG and proteoglycan synthesis

These effects may potentially lead to a reduction in pain and swelling, as well as to increased mobility of the affected joint.[17]

Chondroitin sulphate

Chondroitin sulphate is the predominant glycosaminoglycan of articular cartilage, and is also present in tendons, bones and vertebral discs.[19]

CS has the following effects:

- Increases the hyaluronic acid production in synovial cells, which has a beneficial effect on maintaining viscosity in the synovial fluid.
- Stimulates chondrocyte metabolism, leading to the synthesis of collagen and proteoglycans.
- Inhibits cartilage destruction by degradative enzymes, and stimulates the anabolic processes involved in new cartilage formation.[17, 19]

In a randomised, double-blinded, multicentred study of 70 dogs with confirmed hip or elbow OA, dogs were administered either glucosamine & chondroitin, or carprofen for 70 days.

Scale scoring assessments for pain, weight-bearing and overall condition were performed on days 0, 14, 42, 70 and 98. Statistically significant improvements were found for both glucosamine/chondroitin and carprofen test groups for pain, weight-bearing and overall condition scores.

Dogs receiving glucosamine and chondroitin experienced improvement in pain scores on a scale similar to carprofen-treated dogs from day 42, and also showed a carry-over effect even after treatment was stopped on day 70.[20]

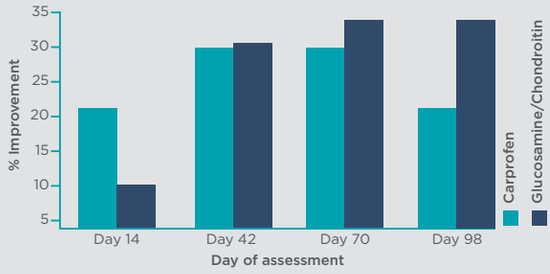


Figure 3. Improvement comparison at different days for dogs receiving carprofen and glucosamine/chondroitin.

In a study of 32 healthy dogs with experimentally induced osteoarthritis, dogs treated with glucosamine & chondroitin three weeks prior to the induction of synovitis experienced more rapid improvements in lameness after the procedure.[21]

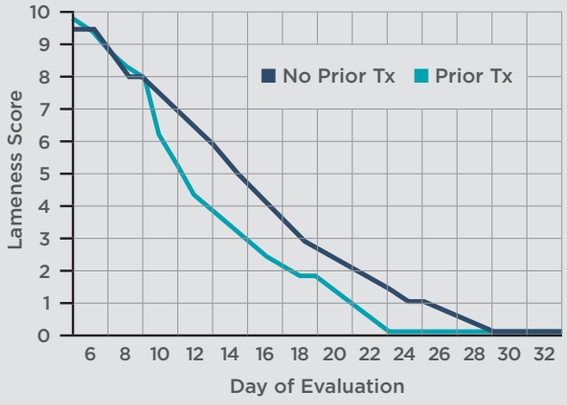


Figure 4. Lameness scores of dogs that received glucosamine & chondroitin supplementation prior to the induction of synovitis, compared with those that did not receive pre-treatment.

THE BIOAVAILABILITY OF CHONDROITIN[19]

The form and source of chondroitin sulphate influences its pharmacokinetic profile. Chondroitin sulphate of bovine origin is superior to that obtained from shark cartilage due to its lower molecular mass and therefore, enhanced bioavailability. On the contrary, high molecular weight chondroitin is less readily absorbed from the gastrointestinal tract.[19]

JOINT PROTECTION

PAW OsteoCare® Joint Protect chews for small dogs

- Contains tasty fish and chickpea protein.
- Specifically designed for daily use in small dogs.
- Supports healthy joints, improves mobility, and protects against joint damage.
- Contains glucosamine, chondroitin, manganese and ascorbic acid to effectively support joint cartilage health.

Key ingredients/ 2.5g chew: Glucosamine sulphate 250mg, Chondroitin sulphate 125mg, Vitamin C 20mg and Manganese gluconate 11mg

Size: 75 g Tub (approx. 30 chews)

Daily Dosage	Dog's body weight (kg)	
	1-7.4	7.5-15
	1 Chew	2 Chews

Administration: Feed daily
Warnings/prescribing information: For animal consumption only

PAW OsteoCare® Joint Protect chews for medium-large breed dogs

- Contains glucosamine & chondroitin sulphate to provide cartilage nutrition for optimal joint cartilage health, and joint function.
- Balanced combination of other nutrients that work together to maintain the health of your dog's joints.
- Palatable fish & chickpea protein chew that is easy to give to dogs on a daily basis.

Key ingredients/ 5g chew: Glucosamine sulphate 500mg, Chondroitin sulphate 250mg, Vitamin C 40mg and Manganese gluconate 22mg

Size: 300 & 500 g Tubs (approx. 60 & 100 chews)

Daily Dosage	Dog's body weight (kg)		
	1-9.9	10-24.9	25+
	½ a Chew	1 Chew	2 Chews

Warnings/prescribing information: For animal comsumption only

Please read the label and follow the directions for use

ANTI-INFLAMMATORY SUPPORT

OMEGA-3 FATTY ACIDS

Animals are unable to synthesise essential fatty acids (EFAs) in sufficient quantities to meet their metabolic needs, making it imperative that they are acquired through dietary or supplementary means. The primary omega-3 fatty acids are docosahexaenoic acid (DHA), eicosapentaenoic acid (EPA) and alpha-linolenic acid (ALA), with high concentrations of EPA and DHA found predominantly in marine sources.[40] EPA and DHA competitively inhibit arachidonic acid metabolism, leading to the production of less inflammatory molecules e.g. prostaglandin E3 and leukotriene B5.[40] As such, they both have potent anti-inflammatory effects, which have been clinically proven to reduce the signs and progression of osteoarthritis.[39]

OMEGA-3 FATTY ACID USE IS EXPERT-ENDORSED

Omega-3 fatty acids are recommended in the 2022 AAHA Pain Management Guidelines for dogs and cats as a tier-1 non pharmaceutical treatment option for chronic pain, and in the management of every COAST (Canine Osteoarthritis Staging Tool) stage, as per the Canadian Consensus Guidelines on OA treatment 2022.[38, 41]

FISH OIL

Supplementation with EPA/DHA-rich fish oil is beneficial as it reduces PGE2 production through competition with less inflammatory prostaglandins. In addition, it reduces thromboxanes, which may in turn suppress proinflammatory mediators IL-1, IL-2 and TNF in cartilage.[24,25]

Indications for fish oil in the management of osteoarthritis cases:[24,25]

- Mild to chronic osteoarthritis, as part of multi-modal therapy
- Potentially as an NSAID-sparing adjunct in cases of severe osteoarthritis

GREEN LIPPED MUSSEL *(PERNA CANALICULUS)*

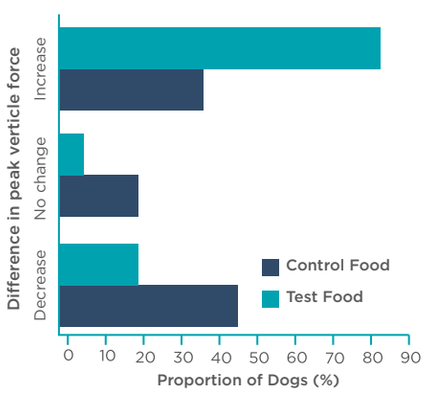
Green lipped mussel (GLM) is endemic to the coastal waters of NZ, and has long been recognised for its anti-inflammatory benefits. GLM contains a range of bioactive lipids, including eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA), and eicosatetraenoic acid (ETA), alongside anti-oxidants and glycosaminoglycans (GAGs).[27]

Whilst the benefits of GLM are widely attributed to its lipid content, GLM also contains many other potentially beneficial nutrients including vitamins E & C, zinc, copper, and manganese.[27]

Clinical trial evaluating the effects of fish oil supplementation on weight bearing in dogs with osteoarthritis.[26]

Thirty-eight dogs with OA across two university clinics were fed a commercial food containing 3.5% fish oil (containing omega-3 fatty acids EPA/DHA). Orthopaedic evaluations and force-plate analysis of the most severely affected limb of each dog was conducted on days 0 and 90. The change in mean peak vertical force between day 0 and 90 was significant for the test-food group (5.6%), but not for the control food group (0.4%). Improvement was seen in 82% of the dogs in the test food group.

Figure 5. Percentage of dogs experiencing the variable changes in peak verticle force between days 0 and 90



Exploring the impact of green lipped mussel compared to carprofen in dogs experiencing chronic arthritic pain.[29]

Forty-five dogs with chronic pain and osteoarthritis were divided into three treatment groups & given carprofen, a placebo product, or GLM. By week eight, dogs in the carprofen and GLM groups showed an 80% improvement in the owner evaluated chronic pain index, and 67% in the veterinary mobility index.

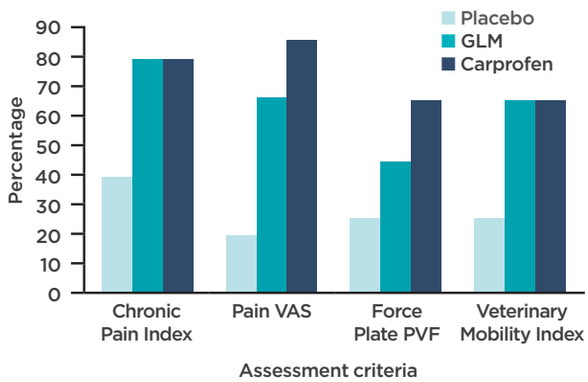


Figure 6. Percentage of improved dogs (using different assessment criteria), following 8 weeks of treatment on a placebo product, GLM or carprofen.

MILD – MODERATE OA MANAGEMENT

PAW Fish Oil 500: Veterinary strength concentrated omega-3 supplement

- Rich in omega-3 fatty acids, EPA and DHA to support joint health.
- Formulated with EPA/DHA ratios (55:45) recommended for dogs based on nutritional standards published by the National Research Council, USA.
- Concentrated low volume formulation aids in reducing diarrhoea risk and excessive calories.
- Mercury, dioxin and PCB tested.

Key ingredients/1mL (1 pump = 0.5mL):
Eicosapentaenoic acid (EPA): 275mg
Docosahexaenoic acid (DHA): 225mg

Size: 200mL pump bottle

Dosage:

Clinical indication for use	Daily dose (mg/kg$^{0.75}$)	Daily dose (per 10 kg dog bodyweight)
Osteoarthritis	310	7 pumps
Inflammatory or immunologic disease (atopy, inflammatory bowel disease)	125	3 pumps
Cardiovascular disease	115	3 pumps
Renal disease	140	4 pumps
Idiopathic hyperlipidaemia	120	3 pumps
Maintenance	30	1 pump every second day

Warnings/prescribing information:

- Fish oil is generally safe and well tolerated. The NRC safe upper limit is 370 mg/kg.$^{0.75}$
- The most commonly expected adverse events are mild, self-limiting gastrointestinal signs.
- Other uncommon or rare side effects may include platelet inhibition, delayed wound healing, weight gain, and altered immune function. Consider discontinuing high doses for 2-3 weeks prior to and following surgery.
- Hyperglycaemia is a potential adverse effect, and caution should be used in diabetic patients receiving insulin concurrently.
- Store below 25°C (air conditioning).
- Protect from light & store in a dry place.

PAW OsteoSupport® Joint Care Powder for Dogs & Cats

- 100% natural green lipped mussel powder manufactured using a one-step proprietary process (Perna128®) to minimise temperature, enzymatic or oxidative damage to essential fatty acids for a highly concentrated product.
- Effective at reducing inflammation.
- High levels of Omega-3 (EPA, DHA & ETA) for fast and effective joint pain relief for dogs & cats.
- Includes a natural source of glycosaminoglycans (chondroitin 6 sulphate) for cartilage production.
- Easy-to-use capsule in a powder format. Open capsule contents and sprinkle over food.

Active Ingredients: Each capsule contains 500mg of pure Green Lipped Mussel powder

Size: Dogs: 80 & 150 capsules
Cats: 60 capsules

Dosage:

Dog's body weight (kg)	<25	25+
Daily dosage	1 capsule	2 capsules
Daily dosage for cats	Feed one capsule daily	

Administration: To be given daily (either whole, or opened and sprinkled directly onto food).

Warnings/prescribing information: Use with precaution in pregnant or lactating animals. Contraindicated in animals with an allergy to seafood. For animal treatment only.

Please read the label and follow the directions for use

ADJUNCTIVE HERBAL SUPPORT

CURCUMIN

Curcumin is a micronutrient commonly found in the dietary spice turmeric. *Curcuma longa* has been shown to exhibit therapeutic potential in various chronic illnesses, and is known to be a potent antioxidant, anti-inflammatory, antiseptic, and anticancer agent.[30]

In vivo canine studies have shown that curcumin is similar to NSAIDs in suppressing the production and catabolic action of pro-inflammatory cytokines such as interleukin-1 (IL-1), and tumour necrosis factor-alpha (TNF-α), both of which are known to play a key role in the pathogenesis of OA.[30]

Curcumin has also been shown to be an effective scavenger of reactive oxygen species (ROS), and reactive nitrogen species *in vitro*. This is of particular importance considering that the degradation of cartilage results from the combination of mechanical stress, along with an increase in matrix metalloproteinases (MMPs), and ROS.[30] *In vivo,* it may have indirect antioxidant properties linked to its ability to inhibit inflammatory enzymes like MMPs, or via enhanced glutathione synthesis.[31]

CURCUMIN-PHOSPHOLIPID COMPLEX INCREASES ABSORPTION

In its pure form, the effectiveness of curcumin is limited due to its poor bioavailability. As such, various delivery methods have been utilised to improve the absorption of curcumin.[31] Formulations including a phospholipid complex have been shown to increase absorption by 29-fold when compared to curcumin on its own. [32]

SUMMARY OF THE BIOLOGICAL ACTIONS OF CURCUMIN ON HUMAN AND ANIMAL JOINT TISSUE[11]

Antioxidant effects

- Scavenges reactive oxygen and nitrogen species *in vitro*
- Inhibits IL-1b-induced nitrous oxide (NO) production by bovine and human chondrocytes, as well as human cartilage explants
- Inhibits IL-1b-induced superoxide dismutase activity in bovine chondrocytes in monolayer

Anti-inflammatory effects

- Inhibits NF-kB-dependent gene transcription in chondrocytes
- Inhibits COX-2, but not COX-1, gene expression in IL-1b-treated bovine chondrocytes in monolayer
- Inhibits IL-6 and IL-8 gene expression by bovine and human chondrocytes
- Inhibits IL-6, IL-8 and PGE2 production by human chondrocytes and cartilage explants

Anti-catabolic effects

- Decreases cell viability of adherent synoviocytes
- Inhibits IL-1b-induced glycosaminoglycan release from canine and human OA cartilage explants
- Decreases MMP-3 synthesis in chondrocytes in alginate beads and in human cartilage explants
- Suppresses IL-1b and OSM-induced MMP-1, MMP-3, MMP-9 and MMP-13 gene expression by human chondrocytes via inhibition of NF-kB activation and nuclear translocation

Anabolic effects

- Reverses the IL-1b-induced inhibition of type II collagen and b1-integrin gene expression in human chondrocytes

Twelve OA affected dogs were randomly assigned to two groups. Group one was treated with curcumin, whilst the second group was treated with the NSAID firocoxib. After 20 days, the curcumin treatment group showed a strong downregulation in the expression of the pro-inflammatory cytokine tumour necrosis factor-alpha (TNF-α). Furthermore, unlike firocoxib, curcumin administration was shown to significantly downregulate the early responding inflammatory cytokine interleukin 18 (IL-18).[30]

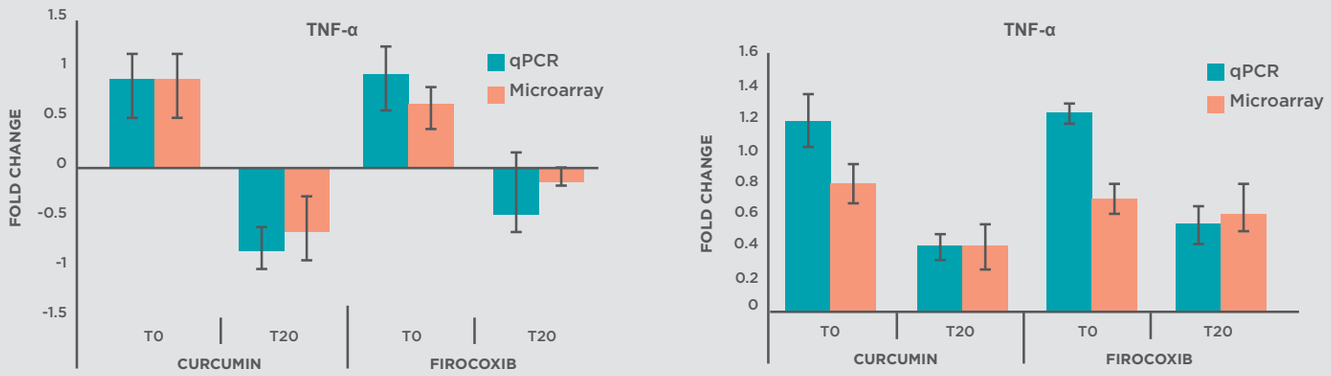


Figure 7. and 8. mRNA expression of selected genes (for TNF-α and IL-18) as determined by real time PCR and microarray analyses. Error bars indicate ±SD.

BOSWELLIA

Boswellia serrata is a tree found in India, Northern Africa, and in the Middle East. Strips of boswellia bark are peeled away, yielding a gummy oleo-resin. Extracts of this gummy exudate have traditionally been used (in the Ayurvedic system) as an anti-arthritic, astringent, stimulant, expectorant, and antiseptic agent.[33]

The anti-inflammatory effects of boswellia and boswellic acids have been linked to its ability to inhibit the synthesis of leukotrienes, the chemical mediators of the inflammatory process in various inflammatory diseases, including OA.[34] It is assumed that the excessive production of leukotrienes is responsible for the maintenance of a chronic inflammatory process, and that inhibition may downregulate the process of disease[33]. Boswellia has been demonstrated to be effective in alleviating the clinical signs of OA in dogs.[33]

THE SYNERGISTIC EFFECTS OF CURCUMIN AND BOSWELLIC ACID[36]

In human and animal studies, curcumin in combination with boswellic acid is more effective at reducing pain-related symptoms in patients with OA, than curcumin alone.[23] Combining *Curcuma longa* and *Boswellia serrata* extracts increases the efficacy of OA treatment, presumably due to the synergistic effects of curcumin and boswellic acid.

BOSWELLIC ACID'S ANTI-INFLAMMATORY ACTIVITY

Boswellic acid is primarily responsible for many of the pharmacological effects of the *Boswellia serrata* tree, including its anti-inflammatory activity.[35] Take note of the boswellic acid content when recommending this ingredient.

Twenty-nine dogs suffering from osteoarthritis or dysplastic joint disease were selected for the study based on their physical examination, history, and radiographs. The daily meal of each dog was supplemented with a standardised extract of boswellia resin at 400 mg/ 10 kg per day for 6 weeks. In 71% of dogs, there was a significant improvement in most of the evaluated clinical signs. In addition, the frequency of external factors; 'lameness when moving' and 'lameness after a long rest' decreased in frequency throughout the 6-week period.[35]

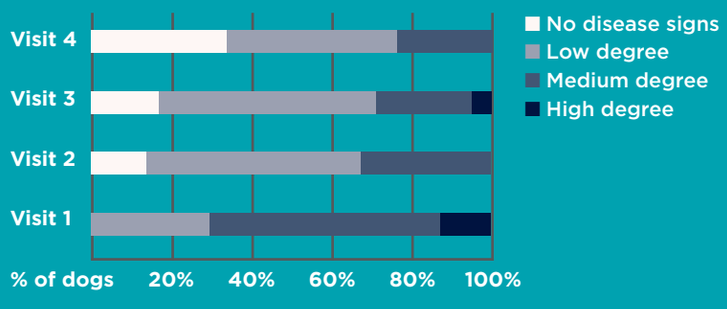


Figure 9. Changing degrees of clinical osteoarthritis before, during, and after treatment with boswellia resin observed between visits 1, 2, 3 & 4 (days 1, 14, 28 and 42) respectively.

THE CLINICAL EFFICACY OF CURCUVET® AND BOSWELLIC ACID IN COMBINATION WITH CONVENTIONAL NUTRACEUTICAL THERAPY.[23]

In a randomised, double- blinded study, 20 client- owned dogs with confirmed osteoarthritis were assigned to one of two groups. The first group (A) received a combination of boswellic acid and Curcuvet® (a patented form of phytosomal turmeric), in addition to a conventional nutraceutical (containing glucosamine, chondroitin sulphate and fish-oil, amongst a few other key ingredients). The second group (B) received the conventional nutraceutical only. All the enrolled dogs underwent a washout period before starting their nutraceutical treatments in the study.

A full orthopaedic and neurological examination, and force plate gait analysis were performed before starting the treatment (T0), at 45 days (T1) and 90 days (T2) of treatment, and at 60 days (T3) post-treatment for an overall study period of 5 months.

Results:

- In both groups, the ground reaction forces were increased.
- In group A, there was a significant increase in VI%BW (vertical impulse normalised to body weight) and ST (stance phase) between T0 and T3.
- In Group A, 8/10 cases showed a PVF%BW (peak vertical force normalised to body weight) value at T3 higher than T0.
- Despite the overall increase in the study, PVF%BW and ST values did not increase significantly for group B. There was only a statistically significant increase in VI%BW between T0 and T3.
- The effects were much more visible after 60 days from the end of the administration period in Group A.

In conclusion, Curcuvet® in combination with boswellic acid can play a key role in reducing lameness and pain, as part of a multimodal treatment regime for canine osteoarthritis.

MODERATE – SEVERE OA MANAGEMENT

PAW OsteoAdvanced®: Clinical joint support chews

- Specifically formulated with ingredients that may help to relieve the symptoms of osteoarthritis in dogs
- Curcumin, *Boswellia serrata* and green lipped mussel provide anti-inflammatory support for arthritic joints in dogs
- Glucosamine and chondroitin support healthy joint cartilage
- Boswellia supports overall joint health and mobility
- Palatable fish & chickpea based chew that is easy to give to dogs as a daily supplement

Key Ingredients/ 5g chew:
Green lipped mussel 500mg, Glucosamine hydrochloride 500mg, Chondroitin sulphate 169mg, *Curcuma longa* phospholipid complex (Curcuvet®) 100mg (equivalent to curcuminoids 20mg) and *Boswellia serrata* resin extract 40mg (equivalent to boswellic acid 27mg)

Size: 300 g Tub (Approx. 60 chews)

Dosage:

Dog's body weight (kg)	1 - 9.9	10 - 19.9	20 - 39.9	40+
Daily Dose	½ a chew	1 chew	1-2 chews	3 chews

Warnings/prescribing information:
For animal consumption only. For veterinary supply only.
Use with precaution in pregnant or lactating animals. This product contains seafood. This product is not an alternative treatment in acute joint inflammation.

IMPROVE MOBILITY IN DOGS SUFFERING FROM OSTEOARTHRITIS WITH PAW OSTEOADVANCED® [37]

In a multi-centred trial of 55 dogs, owners observed mobility improvements within 2 weeks of supplementing daily with PAW OsteoAdvanced®.*

Percentage of owners who observed **mobility improvements** across measures such as walking, running, jumping, moving after rest, & playing, as a result of daily supplementation with **PAW OsteoAdvanced®:**

AFTER 2 WEEKS **60%**

AFTER 3 WEEKS **76%**

AFTER 4 WEEKS **84%**

*All dogs were assessed for trial suitability based on strict inclusion criteria and assessed weekly by their owners

EFFECTS OF PAW OSTEOADVANCED® ON MOBILITY SCORES IN DOGS SUFFERING FROM OSTEOARTHRITIS[37]

Background

In a 28-day trial, fifty-five dogs with osteoarthritis were administered PAW OsteoAdvanced®, a triple action anti-inflammatory fish & chickpea based chew containing a combination of natural ingredients proven to reduce inflammation, and to nourish osteoarthritic joints.

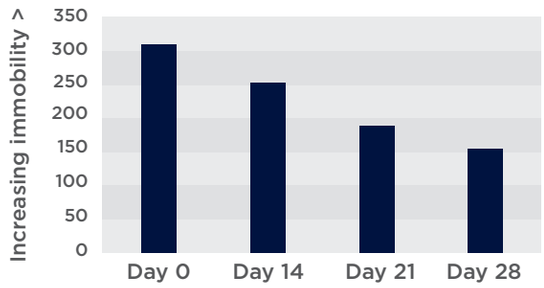
Method

Seventy-one pet owners and their dogs from across Australia participated in the trial. All dogs in the trial suffered from reduced mobility due to osteoarthritis. Dogs ranged in age from 2.5-17 years, with the average participant age being 11 years. Pet owners were provided with a 28-day supply of OsteoAdvanced® to be administered once a day according to the label dose rate. Pet owners were requested to complete a questionnaire assessing the dog's mobility prior to starting treatment, then at days 14, 21 and 28. The questionnaire assessed mobility across five areas – walking, running, jumping, moving after rest, and playing. Responses were given on a scale of 0-4 (0 = no mobility problems; 4 = impossible to do).

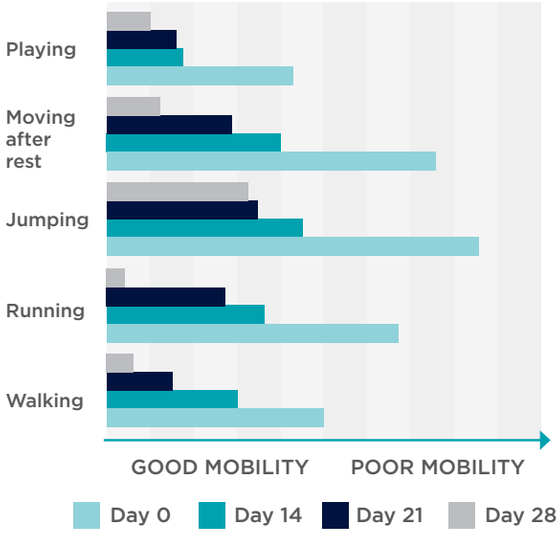
Results

Of the seventy-one participants enrolled in the trial, two did not complete the trial due to ongoing unrelated medical issues, and fourteen pet owners did not complete the questionnaire. A total of fifty-five completed the trial, with 84 percent of pet owners recording improved mobility at the end of the trial period. At 28 days, almost all participants reported no issues with walking compared to at the start of the trial.

Cumulative scores on mobility across all assessable functions



Cumulative owner-reported changes in mobility



DECIDING WHICH PAW JOINT CARE PRODUCT TO RECOMMEND

SIGNS AND SYMPTOMS

NO CLINICAL SIGNS

Predisposed breeds

No signs at present, but known predisposition to developing arthritis later on, such as:

- Large breed dogs
- Highly active or working breeds
- Overweight dogs
- Breeds predisposed to joint conditions
- Dogs that have had joint-related surgery

> 5 years of age

No signs, but the risk of osteoarthritis increases with age.

CLINICAL SIGNS

Mild to moderate

- Stiffness or discomfort first thing in the morning
- Pain or discomfort after strenuous exercise
- Reluctance to jump (in the car, on the bed or on furniture)
- Weight gain (due to reduced movement)
- Moderate pain on joint manipulation or palpation (limbs, hips and spine)
- Reduced range of motion

Moderate to severe

- Great difficulty going up and down stairs
- Stiffness or lameness after exercise
- Slow getting up and lying down
- Weight gain (due to little movement)
- Severe pain on joint manipulation
- Reduced range of motion

MANAGEMENT RECOMMENDATIONS

Use PAW OsteoCare® chews daily to help nourish and support the joint cartilage, as well as to potentially delay the onset of OA and its associated symptoms.

Recommend PAW OsteoCare® chews daily to help nourish and support the joint cartilage *in conjunction* with PAW OsteoSupport® OR PAW Fish Oil 500 to reduce inflammation, and the associated pain.

+

As a part of a multi-modal treatment plan, recommend PAW OsteoAdvanced® chews daily, an all in one supplement containing triple action anti-inflammatory support to aid in reducing osteoarthritic pain, and chondroprotectives to nourish and support joint cartilage.*

Recommend PAW OsteoSupport for cats, an anti-inflammatory green lipped mussel capsule for feline patients with clinical signs of arthritis.

ADJUNCTIVE MANAGEMENT

- Keep the pet at optimum weight
- Regular gentle exercise

- Weight loss (if required)
- Environmental modification e.g. soft, warm bedding, ramps to access the car/furniture.
- Alternative therapies e.g. physiotherapy, hydrotherapy, acupuncture, laser etc.

* Review the role of NSAIDs/disease modifying drugs if immediate pain relief is required
* This guide is designed to be used in conjunction with a multimodal treatment protocol where pharmaceutical intervention may be required as an adjunct to natural therapies

Introducing the PAW Practitioner Range

Developed for vets, by vets.

References

1. Anderson KL, O'Neill DG, Brodbelt DC, et al. Prevalence, duration and risk factors for appendicular osteoarthritis in a UK dog population under primary veterinary care. Sci Rep. 2018;8(1):5641. Published 2018 Apr 4. 2. Rialland, P., Bichot, S., Moreau, M., et al. (2012). Clinical validity of outcome pain measures in naturally occurring canine osteoarthritis. BMC Veterinary Research, 8:162. 3. Slingerland LI, Hazewinkel HA, Meij BP, Picavet P, Voorhout G. Cross-sectional study of the prevalence and clinical features of osteoarthritis in 100 cats. Vet J. 2011 Mar;187(3):304-9. 4. Sandmeier R. H. (2000). Osteoarthritis and Exercise: Does Increased Activity Wear Out Joints?. The Permanente Journal, 4(4), 26–28. 5. Musco N, Vassalotti G, Mastellone V, et al. Effects of a nutritional supplement in dogs affected by osteoarthritis. Vet Med Sci. 2019;5(3):325-335. 6. Canapp D. 2013. Canine Osteoarthritis. Clinician's Brief: 21-23. 7. Man GS, Mologhianu G. Osteoarthritis pathogenesis - a complex process that involves the entire joint. J Med Life. 2014;7(1):37-41. 8. Yuan G., Masuko-Hongo K., Kato T., Nishioka K. Immunologic Intervention in the Pathogenesis of Osteoarthritis. ARTHRITIS & RHEUMATISM Vol. 48, No. 3, March 2003, pp 602–611 9. Wachjudi. (2021). Osteoarthritis Diagnosis and management. Retrieved 2 March 2021, from https://www.slideshare.net/tabibsendi/osteoarthritis-diagnosis-and-management?qid=5c3b1596-e8e0-4592-938d-96d2452e3172&v=&b=&from_search=8 10. (2021). Retrieved 2 March 2021, from https://www.zoetisus.com/products/pages/rimadyldvm/osteoarthritis_iframe.aspx 11. Sanderson RO, Beata C, Flipo RM, Genevois JP, Macias C, Tacke S, Vezzoni A, Innes JF. Systematic review of the management of canine osteoarthritis. Vet Rec. 2009 Apr 4;164(14):418-24. 12. Comblain, F., Barthélémy, N., Lefèbvre, M., Schwartz, C., Lesponne, I., Serisier, S., Feugier, A., Balligand, M., & Henrotin, Y. (2017). A randomized, double-blind, prospective, placebo-controlled study of the efficacy of a diet supplemented with curcuminoids extract, hydrolyzed collagen and green tea extract in owner's dogs with osteoarthritis. BMC veterinary research, 13(1), 395. 13. Mathews, K., Kronen, P. W., Lascelles, D., Nolan, A., Robertson, S., Steagall, P. V., . . . Yamashita, K. (2014). WSAVA Guidelines for Recognition, Assessment and Treatment of Pain. Journal of Small Animal Practice, 1-59. 14. Wynn, S., & Fougere, B. (2007). Introduction: Why Use Herbs? In S. Wynn, & B. Fougere, Veterinary Herbal Medicine (pp. 1-4). St Louis, Missouri: Mosby Elsevier. 15. Structure-Activity Relationships. Iran J Pharm Res 2011 Autumn; 10 (4): 655-683 16. Rakesh M, Niranjan R R, Varsha N. Multimodal Anti-Inflammatory Approach to Osteoarthritis Management - Review of T Cell Immunomodulation with Undenatured (Native) Collagen Type II and LOX Inhibition with Boswellia. Nov Tech Arthrit 17. Jerosch J. Effects of Glucosamine and Chondroitin Sulfate on Cartilage Metabolism in OA: Outlook on Other Nutrient Partners Especially Omega-3 Fatty Acids. Int J Rheumatol. 2011;2011:969012. 18. McCarthy G., O'Donovan J., Jones, B., McAllister H., Seed M. & Mooney C. 2007. Randomised double-blind, positive controlled trial to asses the efficacy of glucosamine/chondroitin sulphate for the treatment of dogs with osteoarthritis. The Veterinary Journal, 174: 54-61 19. Neil, K.M., Caron, J. P., & Orth, M. W. (2005). The role of glucosamine and chondroitin sulphate in treatment for and prevention of osteoarthritis in animals. Journal of the American Veterinarary Medical Association, 1079-1088. 20. McCarthy G., O'Donovan J., Jones, B., McAllister H., Seed M. & Mooney C. 2007. Randomised double-blind, positive controlled trial to asses the efficacy of glucosamine/chondroitin sulphate for the treatment of dogs with osteoarthritis. The Veterinary Journal, 174: 54-61 21. Canapp, S., McLaughlin, R. M., Hoskinson, J. J., Roush, J. K., & Butine, M. D. (1999). Scintigraphic evaluation of dogs with acute synovitis after treatment with glucosamine hydrochloride and chondroitin sulphate. American Journal of Veterinary Research, 1552-1557. 5. Data on file. 22. Martini F.M. et al. 2017. Combining a joint health supplement with tibial plateau leveling osteotomy in dogs with cranial cruciate ligament rupture. An exploratory controlled trial. International Journal of Veterinary Science and Medicine 5 (2017) 105–112 23. Catarino C. et al. 2021. Clinical efficacy of Curcuvet and Boswellic acid combined with conventional nutraceutical product: An aid to canine osteoarthritis. PloS One. May 28;16(5):e0252279. 24. Fritsch, D. A. et al., 2010. A multicenter study of the effect of dietary supplementation with fish oil omega-3 fatty acids on carprofen dosage in dogs with osteoarthritis. Journal of the American Veterinary Medical Association, 236(5), pp. 535-539. 25. Bauer, J. E., 2011. Therapeutic use of fish oils in companion animals. Journal of American Veterinary Medical Association, 239(11), pp. 1441-1451. 26. J. K. et al., 2010. Evaluation of the effects of dietary supplementation with fish oil omega-3 fatty acids on weight bearing in dogs with osteoarthritis. Journal of the American Veterinary Medical Association, 236(1), pp. 67-73. 27. Macrides TA et al. 2003. The anti-inflammatory effect of n-3 tetraenoic fatty acids isolated from lipid extract from the mussel Perna canalicus . Prostaglandins Leukot Essent Fatty Acids, 57(1):205(W20). 28. Treschow A., Hodges L., Wright P., Wynne P., Kalafatis N., Macrides T., Novel anti-inlfammatory Ω-3 PUFAs from the New Zealand green lipped mussel, Perna canaliculus. Comparative Biochemistry and Physiology, Part B 147 (2007) 645-656 29. Hielm-Bjorkman, A., Tulamo, R.-M., Salonen, H., & Raekallio, M. (2009). Evaluating Complementary Therapies for Canine Osteoarthritis Part I: Green-lipped Mussel (Perna canaliculus). Evidence Based Complementary and Alternative Medicine, 365-373. 30. Colitti M., Gaspardo B., Pria AD., Scaini C. & Stefanon B. 2012. Transcriptome modification of white blood cells after dietary administration of curcumin and non-steroidal anti-inflammatory drug in osteoarthritic affected dogs. Veterinary Immunology and Immunopathology, 147: 136-146. 31. Y. Henrotin Et al. Biological actions of curcumin on articular chondrocytes, Bone and Cartilage Research Unit, University of Lie` ge, 2010 32. Cuomo J. et al. Comparative absorption of a standardised curcuminoids mixture and its lecithin formulation, Journal of Natural Products, March 2011. 74, 4, 664-669 33. Ammon H. Boswellic acids in Chronic inflammatory Diseases. Planta Medica 2006; 72(12): 1100-1116 34. Musco N, Vassalotti G, Mastellone V, et al. Effects of a nutritional supplement in dogs affected by osteoarthritis. Vet Med Sci. 2019;5(3):325-335. doi:10.1002/vms3.182 35. Reichling J., Schmokel H., Fitzi J., Bucher S. & Saller R. 2004. Dietary support with Boswellia resin in canine inflammatory joint and spinal disease. Schweiz Arch Tierheilkd, 146 (2):71-79) 36. Haroyan, Armine et al. "Efficacy and safety of curcumin and its combination with boswellic acid in osteoarthritis: a comparative, randomized, double-blind, placebo-controlled study." BMC 37. PAW by Blackmores data. PAW Osteoadvanced multicentric trial, N = 55, 2020 38. Gruen M.E. et al. 2022. 2022 AAHA Pain Management Guidelines for Dogs and Cats. J Am Anim Hosp Assoc 58(2):55-76 39. Monteiro B.P. et al. 2022. 2022 WSAVA guidelines for the recognition, assessment and treatment of pain. Journal of Small Animal Practice. 64(4):177-254 40. Mehler S.J. 2016. A prospective, randomized, double blind, placebo-controlled evaluation of the effects of eicosapentaenoic acid and docosahexaenoic acid on the clinical signs and erythrocyte membrane polyunsaturated fatty acid concentrations in dogs with osteoarthritis. Prostaglandins, Leukotrienes and Essential Fatty Acids 109: 1–7 41. COAST Mosley C. et al. 2022. Proposed Canadian Consensus Guidelines on Osteoarthritis Treatment Based on OA-COAST Stages 1–4. Frontiers in Veterinary Science. 9: Article 830098.

BLK50967