Healthy Holistic
BLUE NATURAL Veterinary Diet®
VOLUME NO.7

BLUE BUFFALO CLINICAL REPORT

Clinical Evidence for: Weight Management

W+U for Dogs and Cats | W+M for Dogs

KEY POINTS

BLUE Natural Veterinary Diet Weight Management Formulations:

1. Nutrition clinically proven to reduce body fat by **39.6%** in dogs and **36.8%** in cats in two months[12]

2. Nutrition clinically proven to support:[12]
   - Lean muscle mass maintenance during weight loss
   - Healthy weight maintenance after weight loss

3. Are formulated to provide an ideal approach for nutritionally managing pets with weight control challenges:
   - Moderate levels of fat and calories
   - Added L-carnitine to facilitate weight loss and maintain lean body mass
   - Added betaine to support oxidation of fat and help protect against hepatic lipidosis during weight loss
   - Increased mixed dietary fiber to promote satiety during weight loss

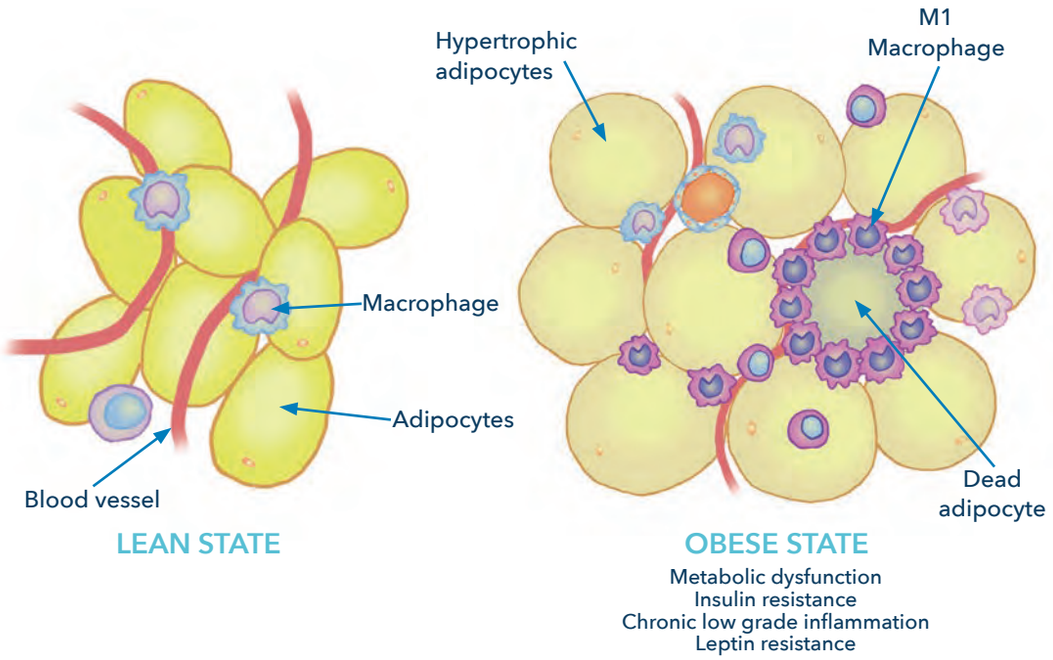


Figure 1. Adipose tissue impacts body metabolism.

Adipose Tissue Metabolism

Originally considered to be an inert tissue that stores fat, adipose tissue is now recognized as one of the more metabolically dynamic organs. In addition to being the primary site of storage for excess energy, it also serves as an endocrine organ capable of synthesizing a number of biologically active compounds that regulate metabolic homeostasis. This tissue is capable of expanding to accommodate increased lipids through hypertrophy of existing adipocytes and by initiating differentiation of pre-adipocytes. Adipose tissue metabolism exerts an impact on whole-body metabolism.

As an endocrine organ, adipose tissue is responsible for the synthesis and secretion of several hormones.[1] These are active in a range of processes, such as control of nutritional intake (leptin, angiotensin), control of sensitivity to insulin and inflammatory process mediators (tumor necrosis factor α (TNF-α), interleukin-6 (IL-6), resistin, visfatin, adiponectin, among others) and pathways (plasminogen activator inhibitor 1 (PAI-1) and acylation stimulating protein (ASP) for example).[2]

The expansion of adipose tissue leads to adipocyte hypertrophy in obesity (See Figure 1). The associated recruitment of macrophages from the bloodstream increases infiltration and inflammation with enhanced production of pro-inflammatory cytokines such as tumor necrosis factor α (TNF-α) and IL-6. This is accomplished by increased release of free fatty acids (FFA) and dysregulated secretion of leptin, adiponectin and resistin. The macrophage and adipose tissue-derived adipokines exacerbate adipose tissue inflammation and can lead to decreased muscle and liver insulin sensitivity[3] and

increased liver glucose production. In contrast, muscle metabolism is reshuffled to a pattern of low glucose uptake and low FFA oxidation (with increases in levels of glycerol substrate for liver gluconeogenesis). These events lead to an increase of plasma glucose, an increase of insulin resistance and increased risk for a number of health conditions.

Pet obesity continues to be a growing problem, affecting the majority of U.S. dogs and cats. Reports indicate that more than 50 percent of cats and dogs are overweight or obese in the U.S.[4] Surprisingly, although pet owners may recognize their pets as being overweight, very few considered this to be a health problem.[5] However, dog and cat owners are not alone as the scientific focus on obesity as a health problem is relatively new. In an epidemiological study conducted less than 20 years ago, even veterinarians did not routinely recognize obese dogs and cats as having a health problem. In that study, veterinarians reported that only 2.0% of dogs and 1.8% of cats were obese, when in fact, 28.3% of dogs and 27.5% of cats were assigned a body condition score at that time that corresponded with overweight or obesity.[6]

OPTIMAL NUTRITION TO MANAGE WEIGHT

CHOOSING THE RIGHT FORMULA

The old adage, "You are what you eat." conveys a powerful message when it comes to therapeutic foods for weight loss. A therapeutic food must provide appropriate levels of nutrients in order to optimize health while reducing body fat. Calorie restriction alone is not enough. To address the overall metabolic needs of dogs and cats during weight loss, BLUE Natural Veterinary Diet weight loss products, W+U Weight Management + Urinary Care for dogs and cats and W+M Weight Management and Mobility Support for dogs, are formulated with moderate levels of fat and calories to facilitate body fat loss while maintaining lean muscle mass. Increased levels of mixed dietary fiber promote satiety and added L-carnitine helps to facilitate weight loss and maintain lean body mass in dogs and cats.[7] Betaine is added to support oxidation of fat and helps protect against hepatic lipidosis in cats during weight loss.[8]

STUDY: CLINICALLY PROVEN WEIGHT LOSS

PURPOSE

To show that feeding BLUE Natural Veterinary Diet dry weight management formulations can result in clinically and statistically significant loss of body weight and body fat, while maintaining lean mass, and thereafter maintain a healthy body weight and composition.

STUDY DESIGN

Two groups of adult overweight/obese dogs (n=15 each for Canine Weight Studies 1 and 2) were enrolled in weight loss studies and two groups of adult overweight/obese dogs (n=15 each for Canine Weight Studies 2 and 3) were enrolled in post-weight loss maintenance studies. Two groups of adult overweight/obese cats (n=15 for Feline Weight Study 1 and n=11 for Feline Weight Study 2) were enrolled in weight loss and post-loss maintenance studies. All animals selected were otherwise clinically healthy and had a minimum body condition score (BCS) of 3.5/5 and a total body fat of at least 28%, and both males and females were included in the groups. Animals were maintained in standard, species-appropriate housing and managed consistently during the study, including providing access to activity/exercise. The study protocols were reviewed and approved by the research facility's institutional animal care and use committee.

Animals were fed the species-appropriate dry BLUE Natural Veterinary Diet W+U Weight Management + Urinary Care food for up to 4 months for the weight loss portion of the study, and for an additional 4 months thereafter for the weight maintenance portion of the feline studies and canine studies 2 and 3. They were offered a daily amount of food determined from the weight loss feeding guidelines and the target weight established by the facility veterinarian. The daily amount of food offered was adjusted during the study to achieve a weekly weight loss of 1-2% for dogs and 1-1.5% for cats. When the animals reached 20% body fat or their ideal weight, they were then fed for an additional 4 months according to weight maintenance feeding guidelines, with feeding amounts adjusted to maintain ideal body weight.

The following assessments were made at study initiation and thereafter: a) Weekly body weight, b) Monthly body composition (body mass as fat/lean/bone mineral) via dual energy x-ray absorptiometry (DEXA) under reversible sedation protocol, c) Monthly physical examination, including BCS, d) Monthly CBC and serum biochemical analysis, e) Monthly serum multiplex assays of key biomarkers of obesity, including insulin and leptin.

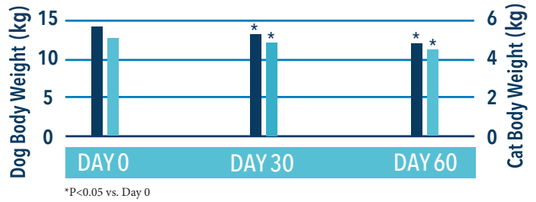
RESULTS[9]

Overall, dogs and cats fed the nutrition in BLUE Natural Veterinary Diet weight management formulas lost significant body weight during the weight loss portion of the study. Animals achieved a BCS between 2.5 and 3.5 (with 3 being considered ideal) by 4 months of feeding.

By day 60, dogs lost a mean of 2.39 kg or 16.3% of their initial body weight, approximately 2% loss of initial weight on a per-week basis (P<0.05). Based on mean values for the 2 studies, dogs had lost 2.27 kgs, or 39.6% of their initial body fat (P<0.05).

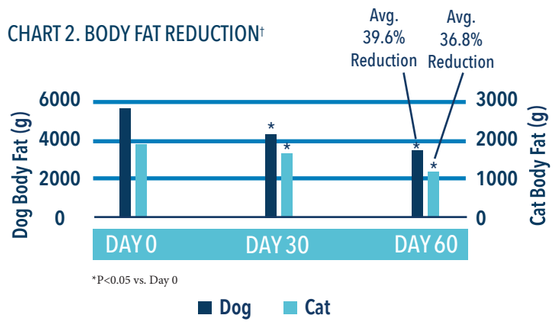
Cats lost a mean of 0.67 kg or 12.5% of their initial body weight, approximately 1.5% loss of initial weight on a per-week basis (P<0.05). Based on mean values for the 2 studies, cats had lost 0.7 kg, or 36.8% of their initial body fat (P<0.05).

CHART 1. STEADY AND HEALTHY RATE OF WEIGHT LOSS IN DOGS AND CATS†



*P<0.05 vs. Day 0

CHART 2. BODY FAT REDUCTION†

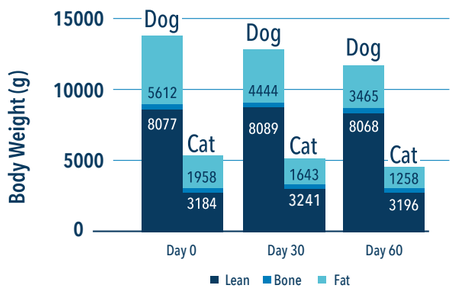


*P<0.05 vs. Day 0

LEAN BODY MASS MAINTAINED

In addition, dogs and cats maintained lean body mass during the weight loss period. Mean lean body mass was essentially unchanged between days 0 and 60 in both species.

CHART 3. BODY COMPOSITION DURING WEIGHT LOSS†



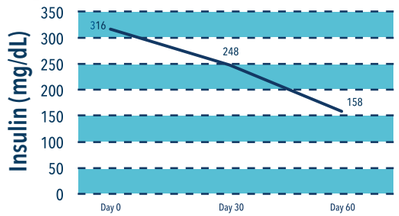
BIOMARKER ACTIVITY

As the dogs and cats lost weight, their serum insulin levels decreased, indicating more normalized regulation of glucose levels as well.

†All charts show aggregated study data.

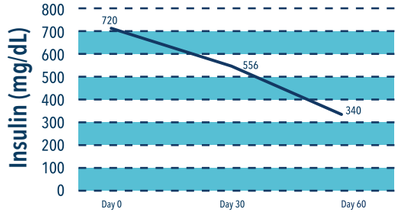
CHARTS 4 & 5. INSULIN LEVELS NORMALIZE WITH WEIGHT LOSS†

Dog Results



P< 0.01 vs. Day 0
Day 30 vs 60 = P < 0.01

Cat Results

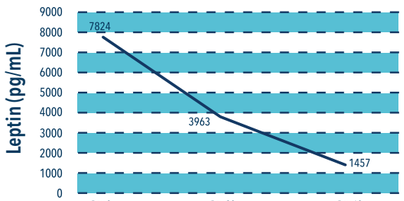


P<0.001 vs. Day 0

Leptin, a protein manufactured by fat cells, is a hormone that regulates satiety and is a key biomarker for fat loss.[10] As body fat mass decreased, leptin levels decreased, as well.

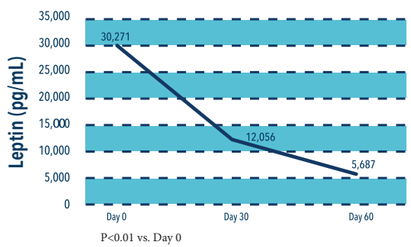
CHARTS 6 & 7. LEPTIN LEVELS DECREASE†

Dog Results



P<0.01 vs. Day 0

Cat Results



P<0.01 vs. Day 0

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6. Lund EM, Armstrong PJ, Kirk CA, et al. Health status and population characteristics of dogs and cats examined at private veterinary practices in the United States. J Am Vet Med Assoc 1999;214:1336–1341.

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9. Blue Buffalo Co., Ltd., data on file, 2015.

10. Radin MJ, Sharkey LC, Holycross BJ. "Adipokines: a review of biological and analytical principles and an update in dogs, cats, and horses." Veterinary Clinical Pathology 38.2 2009.

11. Blue Buffalo Co., Ltd., data on file, 2016.

12. Dry formulas, data on file, 2016.

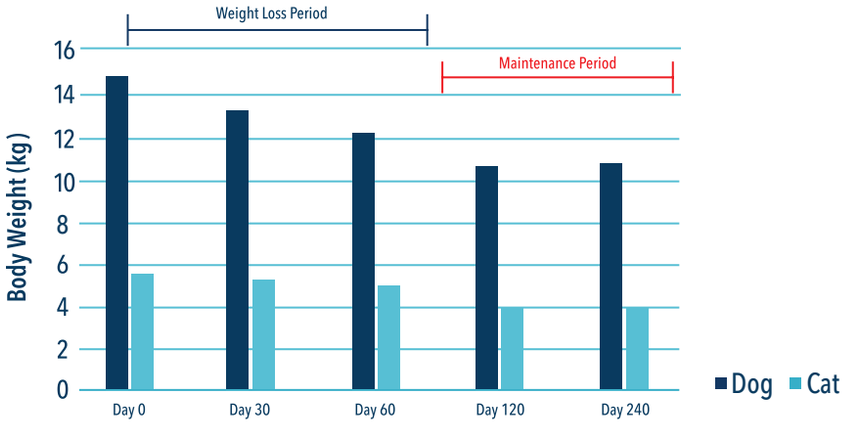
13. Association of American Feed Control Officials 2020 Official Publication.

† All charts show aggregated study data.

MAINTENANCE AFTER WEIGHT LOSS[9, 11]

After weight loss, dogs and cats in the weight maintenance studies also preserved ideal body weight over the 4-month maintenance period. Based on mean values for the 2 studies in dogs and the 2 studies in cats, body weight was essentially unchanged between days 120 and 240.

CHART 8. IDEAL BODY WEIGHT MAINTAINED AFTER WEIGHT LOSS†



In general, and throughout the studies, physical examination findings indicated that dogs and cats remained in good general health and blood values remained within historical normal ranges for the facility.

STUDY: AAFCO FEEDING TRIALS[11]

Animal feeding tests using AAFCO procedures[13] substantiate BLUE Natural Veterinary Diet W+U for Dogs and Cats and W+M for Dogs dry formulas provide complete and balanced nutrition for maintenance of adult dogs and cats.

CLINICAL IMPACT OF NVD WEIGHT LOSS NUTRITION

All BLUE Natural Veterinary Diet weight management products are formulated with moderate levels of fat and calories, increased mixed dietary fiber, and added L-carnitine and betaine to provide an ideal approach to nutritionally manage pets with weight control challenges. The studies discussed in this Clinical Report provide support that this nutritional profile found in BLUE Natural Veterinary Diet weight management formulas, W+U Weight Management + Urinary Care for dogs and cats and W+M Weight Management and Mobility Support for dogs, is clinically effective to reduce body weight and fat, maintain lean muscle mass during weight loss and help dogs and cats maintain a healthy body weight after weight loss.

For more information about Blue Buffalo Quality Assurance Testing and Clinical Research please visit TrueBLUEVets.com or call 1-888-323-BLUE.

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