



Palasurance® SPDD Granulated Enhances Palatability and Tableting Performance in Companion Animal Supplements

Technical Services

KEY CONCLUSIONS:

- *Palasurance® SPDD Granulated is a dry palatant with a particle size range designed specifically for high speed tableting. Tablet Weight control, Friability and Hardness can be optimized.*
- *Palasurance® SPDD Granulated provides superior palatability compared to Granulated Beef Liver and Chicken Powder.*
- *A Beef – Free palatant such as Palasurance® SPDD Granulated allows companion animal supplements to be marketed Worldwide.*

COMPANION ANIMAL SUPPLEMENT MARKET

Companion animal supplements are products that appeal to pet owners that are highly involved with their pets. The global value of the segment was just over \$US 1 billion in 2010, with North America accounting for close to 60% of the market.¹ The market for companion animal supplements is expected to exceed \$US1.2 billion by 2015. The rise in pet obesity is one key driver for supplement use which is an inexpensive form of preventative care for conditions such as osteoarthritis or diabetes which are related to obesity. As pet parents improve the level of care for their pets, maintaining healthy joints, immune systems and general health may require targeted nutritional support. Supplements can provide an affordable approach to preventative care, with the cost of some supplements in the neighborhood of \$0.25/day.

HIGH SPEED TABLETING

The active components in companion animal supplements can vary widely. Supplements may contain 10 or more active compounds in blends targeted to specific health conditions. These active compounds may be unpalatable and may not have physical characteristics that are optimized for high speed tableting, the most common process for manufacturing supplements. Proper operation of high speed tableting equipment requires that the powder blend flow evenly through the hoppers into the pressing equipment and that powder be compressible. Particle size is a critical to optimum tableting performance. Very fine powder is generally not compressible and does not form proper tablets. Particles with a size that is large enough to be compressed and deformed yield better tablets than very fine powders. A range in particle size also allows the particles to organize in a manner that minimizes voids which reduces variability in tablet weight, optimizes hardness and reduces friability.

Compaction Sizing. Pilot testing was conducted to determine feasibility of granulation with Palasurance® SP Dog Dry, a concentrated spray dried canine palatability enhancer. The starting particle size was roughly 75 microns as is typical for spray dried powders. Tableting performance is enhanced when the majority of particles range between 400 – 800 microns, preferably 400 – 600 microns. Figure 1 shows the particle size range for Palasurance SPDD Granulated; the majority of the particles are in the target 400 – 800 micron range.

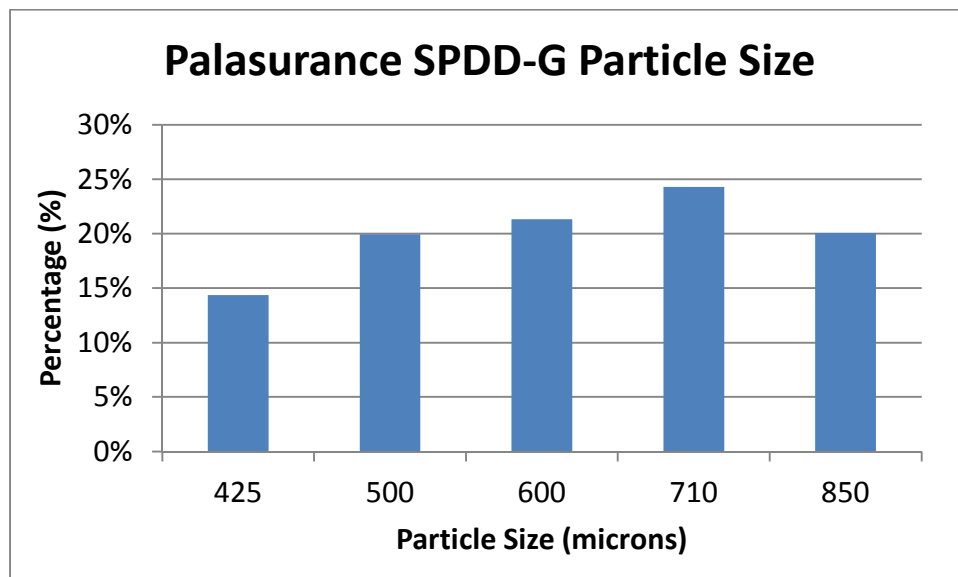


Figure 1. Palasurance® SPDD-G particle size distribution

Tableting Performance. A field trial was conducted in January 2013 in which a range of companion animal supplements were produced at the production facility of a leading United States companion animal supplement manufacturer. Formulations tested included a joint health tablet, a coprophagia deterrent tablet and an immune support tablet. Composition of the active compounds in these tablets is proprietary. The trial compared the standard formulation to a test formulation in which Palasurance® SPDD Granulated replaced the control palatant on a weight per weight basis. Tableting was done on an industrial Fette Tablet Press (Fette America, Rockaway, NJ) running under standard operating conditions for each formulation. Control tablets were collected from a typical production run for each formulation, and test tablets of each formulation with Palasurance SPDD-G were made from 50 kg test batches. Individual tablet weights were measured for control and test tablets of each formulation. Hardness was measured in a LIH-3 Tablet Hardness Tester from Vanguard Pharmaceutical Machinery USA (Spring, TX) and results reported in kiloponds. Friability was measured by tumbling tablets in a tumbler from J. Engelsmann A.G. (Ludwigshafen, Germany) and is reported as the percentage (%) of 100 tablets that show any sign of chipping, capping, separation, breakage or crumbling.

The control palatant for the Joint Health supplement is 6.18% w:w of Beef Liver. This beef liver is commonly used in companion animal supplements because it provides excellent pressability during high speed tableting. The use of a beef product, however, limits export opportunities for marketers of companion animal supplements as beef is not an approved ingredient in many international markets. Also, beef has lost consumer appeal in companion animal products due to extensive publicity about Bovine Spongiform Encephalopathy (BSE). The Joint Health supplement is moderately difficult to press in high speed tableting equipment.

The Coprophagia Deterrent tablet control contains 6% w:w of a custom granulated Chicken Powder, but the granulation is not cost effective at the scale at which it is done. The Coprophagia Deterrent tablet is easy to press with high speed tableting.

The Immune Support tablet contains 17.09% w:w of a competitive Chicken Liver Powder palatant that is not granulated. The actives in this tablet make it extremely difficult to press. In fact, a two stage pressing operation is usually required whereby large, 5 g, slugs are pressed in one tableter, ground and then re-pressed into the final tablet. This two stage process granulates the entire formulation to yield a viable tablet.

Data in Table 1 show that Palasurance® SPDD-G provided similar or better performance under high speed tableting than Beef Liver, Granulated Chicken Powder or Chicken Powder, the most commonly used palatants in the companion animal supplement industry.

Table 1. Performance of Palasurance® SPDD Granulated in high speed tableting.

Tableting Parameters	Joint Health		Coprophagia Deterrent		Immune Health	
	Palasurance SPDD-G	Beef Liver	Palasurance SPDD-G	Granulated Chicken Powder	Palasurance SPDD-G	Chicken Powder
Tablet Weight (g)	3.000 ^a	3.000 ^a	3.000 ^a	2.999 ^a	3.000 ^a	3.000 ^a
Friability (%)	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a	0 ^a
Hardness (Kiloponds)	9.63 ^a	7.99 ^b	7.90 ^a	7.87 ^a	6.35 ^a	5.78 ^a
Two Tail P Value for Hardness	0.0003 (Sig)		0.9734 (NS)		0.1773 (NS)	
Lot #	0243-09	3072-20	0243-08	1702-67	0243-07	0233-52
Sample # (n)	3	9	2	9	6	8

The most discriminating parameter in the tablet trial was the tablet hardness. Data for tablet hardness are also shown in Figure 2. Note the range in hardness of the three formulations, a feature that varies widely based on the type and level of active compounds in the formulation. A range of 8 to 9 for hardness is preferred for companion animal supplements and will provide tablet integrity during distribution without being too hard for chewing and digestion.

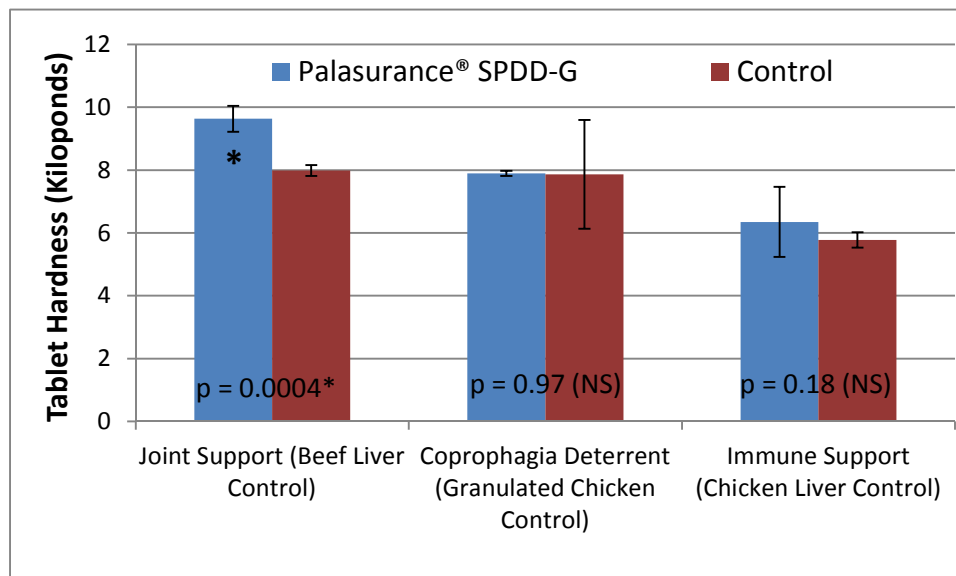


Figure 2. Effect of palatant on companion animal tablet hardness

Palatability. The effect of Palasurance® SPDD-G on palatability of the supplements was measured via treat preference tests in a panel of 20 dogs for five days conducted by Summit Ridge Farms, Susquehanna, Pennsylvania.² Each dog was offered a standard diet for 30 minutes daily. Test treats were offered for 30 minutes two hours after the standard meal. Supplement consumption and first choice were recorded and reported.

Results in Figure 3 show that the Immune Support Tablets made with Palasurance® SPDD-G were strongly preferred compared to tablets made with the Chicken Liver Powder control palatant.³ The Intake Ratio for the tablet containing Palasurance SPDD-G was a highly significant 6.8 to 1.

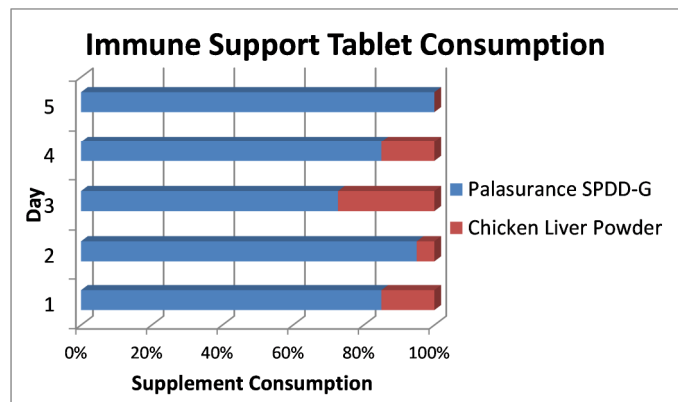
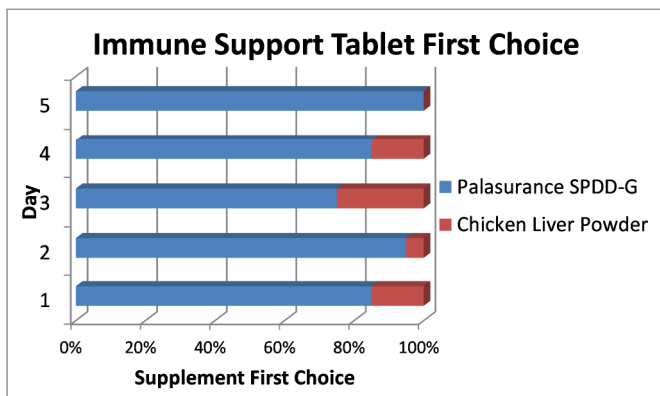
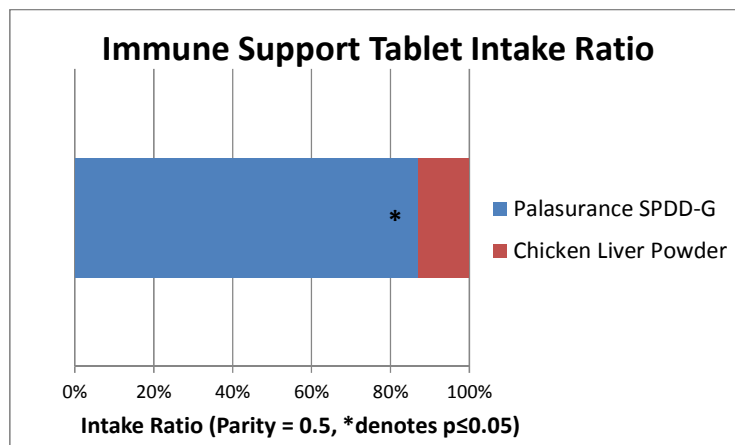


Figure 3. Total Intake Ratio, Daily First Choice and Daily Consumption of Immune Support Tablets made with Palasurance® SPDD-G and Chicken Liver Powder

Consumption results in Figure 4 show that the Joint Support Tablets made with Palasurance® SPDD-G were preferred compared to tablets made with the Beef Liver control palatant.⁴ The Intake Ratio for the tablet containing Palasurance® SPDD-G was a significant 1.67 to 1.

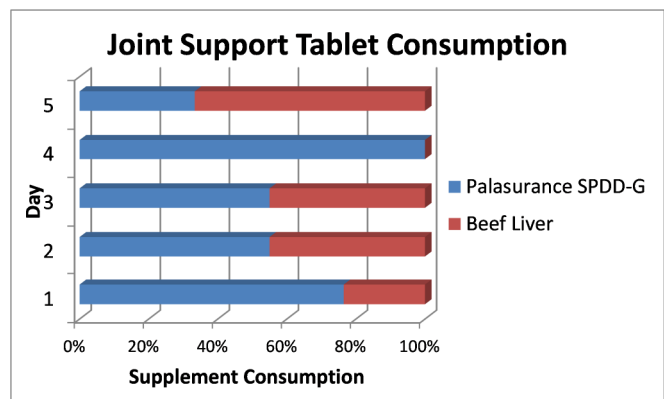
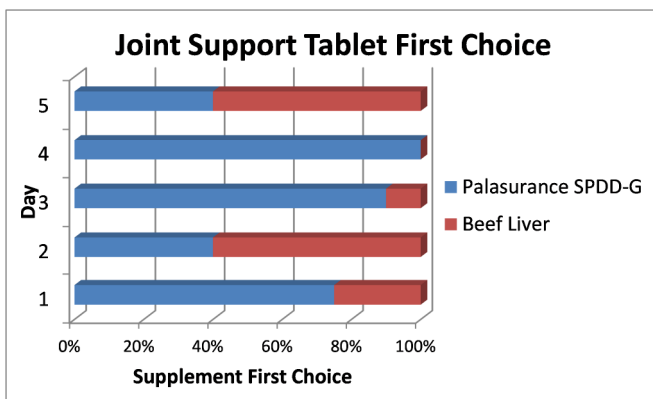
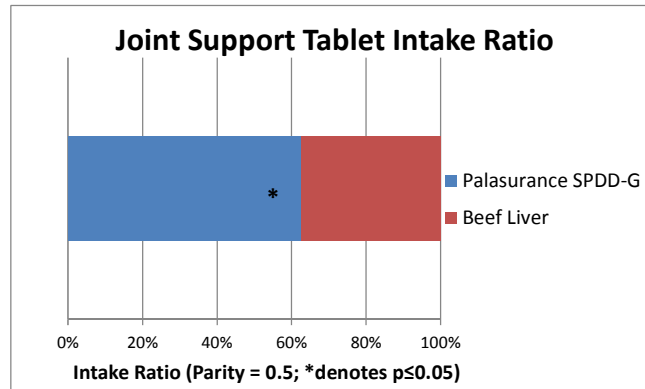


Figure 4. Total Intake Ratio, Daily First Choice and Daily Consumption for Joint Support tablets made with Palasurance® SPDD-G and Beef Liver

GRANULATED PALATANT FOR SUPPLEMENTS

Companion Animal supplements are a growing segment of the petfood industry. Use of nutritional supplements for pets continues to increase as pets live longer, experience age related health issues and pet parents are increasingly willing to invest in their pet’s health. Palatants are needed in supplements to overcome objectionable tastes and aromas of active compounds. Good palatability also reinforces the interaction between the pet and pet parent when a supplement is fed.

Supplements are typically made in high speed tableting processes, and tableting performance can be negatively affected by the type and level of active compounds. Optimization of tableting performance through the use of a palatability enhancer specifically designed for this purpose can alleviate some of the challenges associated with high speed tablet processes. Particle size and particle size range are critical parameters of a palatant and affect tableting performance. Specifically designed granulation of Palasurance® SP Dog Dry high performance dry palatability enhancer was shown to improve tableting performance when compared to commonly used palatants. Palasurance® SPDD Granulated is now available commercially for use in companion animal supplements offering the companion animal supplement industry a non-beef option with proven tableting performance and excellent palatability.

References

1. Euromonitor 2011. Pet food makers look for growth opportunities in pet dietary supplements. Euromonitor International.
2. Diet Supplement Treat Palatability Protocol #PLTR-C09, Summit Ridge Farms, Susquehanna, Pennsylvania
3. Kemin unpublished data SD-13-00016.
4. Kemin unpublished data SD-13-00016.