Application Note

Colour Measurement of Pet Food

REQUIREMENT :

Authorities such as the U.S. FDA and European regulators expect honest labels, authorised colours and consistent product appearance. Instrumental colour measurement turns subjective visual impressions into objective, quantifiable results, evidence that every batch matches declared promises, supports audits and customer claims, and protects the trust behind the brand.

CHALLENGES :

- **Highly heterogeneous samples** (kibble, semi-moist chunks) with varying shapes, textures and inclusions complicate representative sampling.
- **Processing steps** (cooking, drying, and coating) may create non-uniform colour.
- **Natural ingredients** introduce lot-to-lot colour variability.

SOLUTIONS

COLORFLEX L2

ColorFlex L2 features a small, compact design and a convenient sample cup, making it easy to handle and accurately measure homogeneous pet food samples such as wet or canned pet foods.

AEROS

Aeros enables non-destructive colour analysis of highly textured products including kibble, pates, stews, dehydrated and frozen raw foods, and powders with little to no sample preparation.

BENEFITS

1. **Ensuring Colour Consistency Across Batches**
   Spectrophotometers ensure consistent pet food colour, which builds consumer trust in a product's freshness and nutritional value.

2. **Reducing Waste and Production Costs**
   Early colour issue detection and correction during pet food production helps minimize waste, cut costs, and boost yield for a fast return on investment.

3. **Data-Driven Process Optimization**
   Spectrophotometers deliver objective colour data, helping pet food manufacturers monitor ingredient and process changes to improve consistency, tighten control, and reduce waste.

4. **Accurate Ingredient Colour Matching**
   Spectrophotometers provide objective data that supports accurate colour matching of incoming ingredients and finished pet food.

Measuring the Colour of Pet Food

Colour control in pet food is a key quality attribute that directly supports consistency and brand trust. **Rather than being merely cosmetic, it provides a fast, objective signal of process change.** Spectrophotometric measurements take only seconds and act as an early warning for moisture-related issues (over-drying, sogginess, browning) and for variations in ingredient or coating uniformity between batches.

Visible, unexpected colour differences also serve as a practical cue that a batch may require further investigation, whether that involves checking raw materials, reviewing process settings, or examining storage conditions. Authorities such as the FDA highlight "off colour" as one of the product characteristics consumers should report, underlining its importance. Consistent, traceable colour data is particularly valuable for frozen raw products, where cold chain control is essential, but the same proactive monitoring strengthens quality and brand confidence across all types of pet food.

In today's pet food market, public concern over safety and quality is steadily increasing, and manufacturers are under growing pressure to protect product integrity and brand trust. Instrumental colour control is a simple but powerful part of this effort. By detecting colour shifts early, manufacturers can prevent costly rework and waste while safeguarding the consistent appearance that pet owners expect from their preferred brands. When used systematically, colour measurement becomes not just a cosmetic check, but a cornerstone of quality assurance and risk reduction in pet food production.

Why Colour Control Matters in Pet Food

- **Protect product safety**

Instrumental checks adds a fast, non-destructive early warning layer, flagging atypical batches for HACCP and preventive control review.

- **Early warning for process drift**

Trending colour data highlights shifts in raw materials, drying or coating before they turn into waste, complaints or rework.

- **Optimise functional colour ingredients and cost**

Functional colourants, such as carotenoids, also carry vitamins or key nutrients that pets may not synthesise. Precise colour control keeps them on-spec, reduces waste, and protects ROI.

- **Deliver consistent visual appeal**

Colour says a lot about quality. Consistent colour across kibble, treats, and canned food builds trust and helps pet owners feel confident in their choices.

- **Build a stronger brand**

Consistent quality inspires loyalty. Fast, precise colour control helps brand stand out and reinforces a commitment to pet health.

Regulatory Requirements and Documentation

In many markets, regulators in US and EU strictly control which colour additives can be used in pet food and how they must be declared on the label, making documented, objective colour control an important part of compliance and brand protection. Across Asia–Pacific, feed and pet food authorities follow similar principles, controlling permitted colours, additives and labelling—especially for products destined for export to the US and EU.

Objective, repeatable data empowers QA teams to ensure compliance, respond confidently to auditor and customer inquiries, and protect high-value brands by demonstrating consistent production and validating all colour declarations and claims.

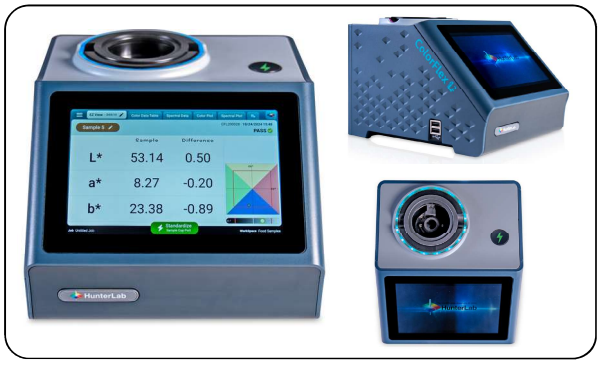
Types of Pet foods

- Dry kibble
- Wet/canned foods
- Semi-moist varieties
- Dehydrated or freeze-dried foods
- Raw/BARF diets (Biologically Appropriate Raw Food)
- Treats and specialty/therapeutic diets

The Solutions

The sections below outline recommended solutions for colour measurement of pet foods.

ColorFlex L2



ColorFlex L2 features a small, compact design and a convenient sample cup, making it easy to handle and accurately measure **homogeneous** pet food samples such as **wet or canned pet foods.**

Aeros

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Solution 1: HunterLab ColorFlex L2

HunterLab's new benchtop colour spectrophotometer combines a modern smart interface and a sealed, spill-proof design with the standalone power to operate without a PC.

- Experience rapid, accurate colour measurement in seconds through **an intuitive smart touchscreen, all protected by a rugged, spill-proof case** engineered for demanding conditions.

- Experience ultimate flexibility with the ColorFlex L2, **a powerful standalone colour workstation** that requires no computer, but can easily transform into a **full desktop setup** by simply connecting a monitor, keyboard, and mouse.

- The **integrated camera** ensures precise sample positioning to eliminate errors and enables **seamless screen recording** to accelerate quality control decisions and collaboration.

For example, under China's *Catalogue of Feed Additive Varieties*, permitted colourants for pet food include:

β-carotene, natural lutein (from marigold), astaxanthin, lemon yellow (tartrazine), sunset yellow, Allura Red, Ponceau 4R, indigo, titanium dioxide, caramel colour (ammonium sulfite process), erythrosine, cochineal red (carmine), red iron oxide, sorghum red, Monascus red, red yeast rice, copper sodium (or potassium) chlorophyllin, gardenia blue, gardenia yellow, new red, acid red, radish red, lycopene, amaranth, and brilliant blue.

Functional colourants carry vitamins or nutrients and need to be optimised for cost and ROI.

*"At a leading global pet food manufacturer, the **ColorFlex EZ (the predecessor of ColorFlex L2)** is integral to our quality control. We use it to measure colour at three critical stages: raw materials, post-additives, and final product, ensuring every batch consistently meets our internal colour standards."*

Quality Control Manager
Leading Global Pet Food Manufacturer

Solution 2 : HunterLab Aeros

HunterLab has developed a unique spectrophotometer ideal for all types of non-homogeneous samples, such as pet food: the colour spectrophotometer Aeros.

- It utilises **non-contact measurement** that eliminates contamination risks while measuring pet food in their state. No sample preparation is required and reduce sample cleanup time.
- **The Smart Sensor Technology with Automatic Height Positioning** automatically sets the optimal sensor-to-sample distance, delivering accurate measurements of pet food of varying shapes and sizes. By eliminating operator variability, Aeros minimizes uncertainty, enhances repeatability and accuracy, and **prevents the inconsistent results often caused by portable instruments due to uneven sample presentation.**
- The Aeros captures the world's largest sample area, **27.5 square inches in 5 seconds with 35 measurements per rotation,** ensuring accurate colour analysis of pet food with their natural size variations.
- The Aeros eliminates subjective visual judgment, delivering consistent, **unbiased results regardless of the operator,** while its **user-friendly design allows operators to be trained quickly and efficiently.**
- The instrument includes **EasyMatch Essentials software** with all the colour indices and metrics needed including CIELAB, CIE LCh, Hunter Lab, and more. This eliminates the need for separate PC software while delivering comprehensive colour analysis.

Recommended Implementation Strategy

The colour spectrophotometer is ideally used for quality checking at these key steps in the **dry pet food manufacturing process.** The same colour checkpoints concept can be adapted for canned, semi-moist, and raw foods.

- ***Raw Material Inspection:*** Manufacturers can ensure each batch's natural colour is within the expected range before processing by implementing instrumental measurement of key inputs like meat, vegetables, and grains.

- ***Post Extrusion/ Drying***: Immediate colour assessment after cooking or extrusion to check for process induced changes such as darkening, burning, or nonuniformity.

- ***Final Packaging QC*:** Verify colour consistency batch-to-batch at packaging before sealing; this is the last opportunity to catch discrepancies that could affect market perception or compliance.

Ingredient Reception

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Grinding & Mixing

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Preconditioning

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Extrusion

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Drying

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Cooling

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Coating

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Quality Control

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Packaging

- ***Post Grinding and Mixing***: Assess blended raw material colour to confirm uniformity and detect inadvertent contaminations.

- ***Cooling/Coating:*** Confirm that colour remains stable after addition of fats, flavors, or topical coatings, and that no undesirable discolouration occurs.

- ***Continuous In-Line Monitoring*** **:** Use in-line spectrophotometers on automated lines for continuous, fast measurement of bulk product—enabling real-time adjustment and minimizing waste.

Measurement

ColorFlex L2

Pour the **Wet Pet Food Sample A** into the sample cup and press measure. Result will be ready in seconds.

Settings :
Colour scale:
CIE L*a*b*

Illuminant /observer angle:
D65/10°

Table 1: Colour values of wet pet food sample A

Sample/Results	L*	a*	b*
Wet Pet Food Sample A	35.80	12.20	26.40

Aeros

Pour the **Kibble B** into the sample tray and press measure. Samples automatically rotate beneath the Smart Sensor, measure for 5 seconds with 35 measurements taken in 27.5 square inches of sample.

Settings :
Colour scale:
CIE L*a*b*

Illuminant /observer angle:
D65/10°

Table 2: Colour values of kibble B

Sample/Results	L*	a*	b*
Kibble B	31.90	12.52	19.81

Practical steps for pet food plant

- Choose the right colour spectrophotometer and standard operating method
- Define target L*, a*, b* and ΔE tolerances for each SKU
- Install colour checks at key points:
  - Raw Material
  - Post-coating
  - Final product before packing / release
- Train QA and production to use colour data for decisions, not just for reports

This is not about adding one more test. It is about using colour as a simple, quick indicator to support existing decisions — release, hold, adjust process, or investigate materials. Instrumental colour checks can be built into HACCP plan or GFSI-aligned food safety system (e.g., CCP/CPs for browning or coating uniformity), with digital results feeding directly into SPC or LIMS.

Conclusion

Spectrophotometric colour measurement gives pet food manufacturers a clear, repeatable standard that links research and development with full-scale production. During product development, it defines the target appearance and allowable tolerances for each formulation. During manufacturing, continuous colour monitoring confirms that every batch remains within these limits and immediately flags any deviation. This allows teams to isolate the cause, contain or rework affected product, and avoid the cost and risk of releasing items that fall outside specification. Thanks to the reliability of modern spectrophotometric technology, colour control becomes a routine part of quality assurance, supporting regulatory compliance while ensuring that pet foods remain safe, visually appealing, and consistent in the eyes of pet owners. With local HunterLab teams and distributors across Asia Pacific, we help you align colour control with your country's regulations and export requirements.

About HunterLab

For over 70 years, HunterLab has set the global standard in colour measurement empowering industries to make colour a precise, consistent, and measurable quality benchmark. Trusted in more than 55 countries, our innovations have transformed colour control across food, pharmaceuticals, plastics, paints, and more driving quality, sustainability, and product integrity. HunterLab applies leading edge technology to measure and communicate colour simply and effectively. The company offers both diffuse/8° and a complete line of true 45°/0° optical geometry instruments in portable, benchtop and production in-line configurations. HunterLab, the world's true measure of colour.

To discuss your pet food line, arrange a demo, or develop a colour control method tailored to your products, contact HunterLab Asia Pacific or your local HunterLab distributor.
For more information, please visit www.hunterlab.com

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