



# Which palatant?

Standard vs. premium palatability enhancers

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In real production line conditions, tests were conducted to objectively answer the following questions:

•What are the effects of replacing a standard liquid palatant at 4% with a premium liquid palatant at 1.5% in a dog kibble production line?

•What are the effects of replacing a standard liquid palatant at 4% with a dry palatant at 1% in a cat kibble production line?

Test results indicate that using premium palatants allows for improved control of final kibble moisture and water activity, and thus can help:

- Increase line capacity;
- Improve palatability; and
- Reduce costs.

The dryer is often a limiting step in the production line. Less

drying is required if premium liquid or powdered palatability enhancers are used. Thus, line capacity can be increased and energy savings can be realized.

## Protocol used

We used two industrial production lines, a "dog" line and a "cat" line, with following protocol.

To change moisture levels, we chose to change only one parameter: The air temperature of the dryer. This protocol allows the following parameters to remain constant:

- Amount of time in the dryer;
- Thickness of product on the dryer belt; and
- Airflow.

Kibble moisture was measured at the extruder outlet, the dryer inlet, the dryer outlet, the cooler inlet and the cooler outlet. Each testing period was uninterrupted. The dog kibble production was a seven hour period. The cat kibble production was an eight hour period.

**Extrusion.** Dog kibbles were produced with a single screw Wenger-type of extruder. Cat kibbles were produced with a twin screw Clextral extruder. A preconditioner was set up on each line. Extrusion parameters remained stable and linear during the whole testing period. The expansion rate of kibbles remained stable during testing. The expansion rate of dog kibbles was 70%. The expansion rate of cat kibbles was between 44 and 48%.

**Drying.** Two belt horizontal dryers (one way) were used. Belt speed remained unchanged during the whole testing period. Drying homogeneity was controlled at the end of the first belt and at both dryer outlets—moisture variation was below 0.7% in the dog kibble trials and below 0.5% in the cat kibble trials.

**Coating.** In both cases, a brush coater was used. The coating sequence used was

- Application of fat;
- Application of liquid palatability enhancers; and
- Application of powder.

**Cooling.** On both dog and cat production lines, kibbles were cooled on a two belt horizontal cooler.

## Dog kibble test results

Using 4% of the standard liquid palatability enhancer added 3% moisture to the finished kibbles. Using 1.5% of

### Premium PE: Better moisture control

Table 1. When the standard PE was used on kibble with two different moisture levels, final moistures were 8.7% and 11.74%. When the premium PE was used on kibble with two different moisture levels, final moistures were 6.5% and 9.5%. PE = palatability enhancer.

6.2% moisture after drying Coating 4% standard PE Final moisture 8.7% aW: 0.57	9.5% moisture after drying Coating 4% standard PE Final moisture 11.74% aW: 0.64
Coating 1.5% premium PE Final moisture 6.5% aW: 0.33	Coating 1.5% premium PE Final moisture 9.5% aW: 0.58

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## Palatability—dog kibble

Table 2. The A kibble needs to be dried to 6.2% moisture, because the standard palatant adds more moisture. Palatability testing results showed the B kibble to be significantly more palatable than the A kibble. PE = palatability enhancer.

A kibble (4% standard)	B kibble (1.5% premium)
Uncoated kibble 6.2% moisture	Uncoated kibble 9.5% moisture
6% of pork fat	8% of pork fat
4% standard PE	1.5% premium PE
Final moisture: 9.94%	Final moisture: 9.94%

the premium liquid palatability enhancer added 1.15% moisture to the finished kibbles. Table 1 shows that when the standard PE was used on kibble with two different moisture levels (6.2% and 9.5%), final moistures were 8.7% and 11.74%. When the premium PE was used on kibble with two different moisture levels (6.2% and 9.5%), final moistures were 6.5% and 9.5%.

For this test, the final target moisture was less than 10% and the final target water activity was less than <0.60. To reach these targets when adding 4% of the standard liquid palatant, it was necessary that the kibble moisture before coating be 6-6.5%.

Product produced for the dog palatability tests are shown in Table 2. The A kibble had to be dried to 6.2% moisture, because the standard palatant adds more moisture. Palatability testing results showed the B kibble to be significantly more palatable than the A kibble. Using 36 dogs, the B kibble was preferred 60-65% of the time.

However, in the higher-moisture kibbles there may be positive interactions between the palatability enhancer and higher moisture. In additional tests, it will be important to check the intrinsic effect of moisture on palatability.

## Powdered PE: Less drying required

Table 3. The powdered PE can be applied to higher moisture kibbles. In both cases, 4% poultry fat was applied before palatant added. PE = palatability enhancer.

6.2% moisture after drying	9.5% moisture after drying
Coating 4% standard liquid PE	Coating 1% powdered PE
4% poultry fat	4% poultry fat
Final moisture 9%	Final moisture 9.02%
aW: 0.58	aW: 0.54

## Palatability—cat kibble

Table 4. The A kibble needs to be dried to 6.2% moisture, because the standard palatant adds more moisture. Palatability testing results showed the B kibble to be more palatable than the A kibble (highly significant). PE = palatability enhancer.

A kibble (4% standard)	B kibble (1% powdered)
Uncoated kibble 6.5% moisture	Uncoated kibble 9.5% moisture
6% of poultry fat	6% of poultry fat
4% standard liquid PE	1% powdered PE
No added water	No added water
Final moisture 9.0%	Final moisture 9.02%

## Capacity and energy use

When a premium PE is used, the kibble moisture after drying can be higher. Compared to drying the kibbles to 6.2% moisture, drying the kibbles to only 9.5% moisture allows a theoretical capacity gain of 44.4%. This value varies with the industrial unit in which tests are performed.

Electrical and thermal energy expenses make up the cost of drying. When less drying is required there is an energy savings of €0.63 (US\$0.79) per percent of moisture per ton produced.

## Cat kibble test results

Products produced for the cat palatability tests are shown in Table 3. The A kibble had to be dried to 6.2% moisture, because the standard palatant adds more moisture. Palatability testing results showed the B kibble to be significantly more palatable than the A kibble. Using 34 cats, the B kibble was preferred 65-72% of the time.

When a premium PE is used, the cat kibble moisture after drying can be higher. Compared to drying the kibbles to 6.2% moisture, drying the kibbles to only 9.5% moisture allows a theoretical capacity gain of 32%. This value varies with the industrial unit in which tests are performed.

When less cat kibble drying is required there is an energy savings of €0.716 (US\$0.90) per percent of moisture per ton produced.

## Importance of moisture control

These test results indicate that the use of premium palatants allows for improved control of final kibble moisture and water activity, and thus can help improve palatability and reduce costs.