

Value of feed ingredient characteristics evaluated

Feed customers were surveyed on their preferences for various poultry feed characteristics and the willingness to pay for various characteristics.

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PRICE volatility and supply variability for feed grains, oilseeds and animal protein products have been extreme in recent years. The interaction of feed grain and oilseed supplies has dramatically affected subsequent supplies and prices of animal protein products.

However, relatively little attention has been paid to supplies and prices of animal proteins and protein products. By gaining a better understanding of this issue, stakeholders and policy-makers can better address performance, feed quality, price and other economic matters associated with the poultry sector.

Problem statement

In late 2014, H.J. Baker approached Forecasting & Business Analytics to design research to identify the value of its poultry feed ingredients. One component of this research project was conducting a customer survey with the overall objective of describing the characteristics of H.J. Baker's customer base and ascertaining customers' opinions of value regarding feed ingredients and product components.

The survey focused on:

1. Describing the characteristics of nutritionists and buyers of feed ingredients;
2. Identifying the importance and preferences of various tangible and intangible poultry feed product characteristics, and
3. Determining the "willingness to pay"

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(WTP) for various tangible and intangible poultry feed product characteristics.

Survey design

The survey questions dealt with modern poultry nutrition practices and nutritionists' and buyers' WTP for various characteristics, some of which are tangible and some intangible, including:

- A reduction in feed mill downtime;
- The presence of microbial control;
- The presence of feed preservatives;
- Uniformity and consistency (nutrient density);
- Reduction in the variation of the feed mix;
- Amino acid availability;

- On-time delivery;
- How the feed mix affects the environmental conditions of the bird, and
- The dependability/integrity of the supplier(s).

The survey also included questions related to costs per ton of feed, value of synthetics, size of feeding operations, extent of emphasis on prophylactic antibiotic use and extent of focus on vegetarian diets, antibiotic-free diets and organic diets.

Seventy-one percent of the respondents were nutritionists. However, responses were also received from veterinarians, live production managers, purchasing managers, consultants and buyers.

Sixty-two percent have been formulating rations for more than 10 years. Most respondents were the decision-makers for feed formulation and purchasing within their company. Respondents formulated feed for broilers, breeders, pullets, turkeys and commercial layers.

In terms of annual feed production, 30% of the participants formulate for companies producing 0.5-1.5 million tons of feed,

1. Calculation of the unconditional value of tangible product characteristics

Characteristic	-----WTP, \$/ton-----					Weighted avg.
	0	1-5	5-10	10-20	>20	
Free of microbials	8	6	1	1	2	4.31
Feed preservatives	8	7	1	0	2	3.61
Nutritional efficiency	9	4	3	0	2	4.03
High nutrient density	8	5	3	0	2	4.17
Low nutrient variability	10	3	3	0	2	3.89
Amino acid availability	7	5	3	1	2	5.00
Extended shelf life	11	4	1	0	2	3.19
Decreased oxidation of fats	9	5	2	0	2	3.75
Decreased protein denaturing	9	4	3	0	2	4.03
Consistent moisture levels	9	6	1	0	2	3.47
Safe and effective flow agents	11	5	0	0	2	2.92
Nutrient density						
uniformity/consistency	7	7	1	1	2	4.44
Total						46.81

2. Preferences for specific attributes of animal protein product suppliers (%)

Answer options	Not preferred	Somewhat preferred	Preferred	Highly preferred	Not applicable
Decrease in feed mill downtime	10	15	30	35	10
Accurate product information	5	10	15	70	0
Technical information available	10	20	15	55	0
Technical assistance available	10	15	35	40	0
Product availability	5	0	35	60	0
Short lead time for delivery	10	20	40	30	0
Prompt customer service	10	0	50	40	0
Accurate and timely invoicing	10	5	55	30	0
Just-in-time delivery	20	20	25	35	0
Delivery during crisis	5	15	10	65	5

with 29% producing greater than 5.0 million tons and 24% producing between 1.5 million and 5.0 million tons. Broiler finisher, growout and starter feeds comprised just more than 85% of total tonnage. Of the feeds formulated by the participants, 74% were traditional rations, 16% were antibiotic-free and 6% were vegetarian.

Survey results

General feed attributes. Factors important to the respondents included: cost (95.2%), uniformity/consistency (90.5%), quality (85.7%), on-time delivery (57.1%), microbial control (42.9%) and the presence of feed preservatives (23.8%).

Major challenges indicated by respondents were: amino acid availability (76.2%), competitive pricing (76.2%), uniformity of various formulas (71.4%), bin space (71.4%), improvement in bird performance (66.7%), on-time delivery (52.4%), microbial control (38.1%), dried distillers grains (19.0%) and added feed preservatives (14.3%).

Tangible feed attributes. A series of questions asked respondents to identify the importance of various tangible product attributes for feed ingredients and their WTP for these attributes.

For feed grains and dried distillers grains, respondents ranked amino acid availability, nutritional efficiency, consistent moisture levels and high nutrient variability as important to very important. Despite their importance, the maximum WTP was \$5-10 per ton. A majority of respondents were either not willing to pay any additional amounts for these characteristics or would pay, at most, \$1-5 per ton extra.

For soybean meal, the top four attributes were amino acid availability, nutritional efficiency, high nutrient density and low nutrient variability. Despite the importance of these characteristics, the maximum WTP for product free of microbials and for amino acid availability was \$10-20 per ton.

For freshness, nutritional efficiency, high nutrient density, low nutrient variability and consistent moisture levels, the maximum WTP was \$5-10 per ton extra. A notable number of respondents were not willing to pay for these characteristics.

For meat and bone meal, poultry meal and fish meal, characteristics such as amino acid availability, nutritional efficiency, uniformity/consistency of nutrient density and microbial-free were the top four attributes cited. Despite their importance, the maximum WTP was between \$1-5 and \$5-10 per ton for meat and bone meal, poultry meal and fish meal with these characteristics. Thirty percent were unwilling to pay for these attributes.

For protein premixes, the top four ingredient characteristics were amino acid availability, uniformity/consistency of nutrient density, microbial-free and high nutrient density; these attributes were ranked important to very important. Nonetheless, most respondents were either unwilling to pay any additional amount or were willing to pay a maximum of \$1-5 per ton more.

Respondents assessed 12 product characteristics, as shown in Table 1. An "unconditional value" was calculated using the midpoint of each range of possible WTP and assumed that all 12 factors were additive. That is, the characteristics comprised a complete package of the attributes. The result of this calculation is a weighted sum of attributes, the total of which was found to be \$46.81 per ton. If only those respondents who said they were willing to pay for these attributes were included, the same weighted sum approach yielded what is referred to as a "conditional value" of \$94.22 per ton.

Additionally, the following attributes of an animal protein product were either preferred or highly preferred: total digestible amino acid availability, no antibiotics included, no ionophores included, the impact of feed on gut health, total amino acid levels, ease of feed handling/flowability and pepsin digestibility.

Further, the following attributes were somewhat preferred in an animal protein product: total fatty acid profiles, consistent moisture levels and the impact of feed in the bird environment; the following attributes were not preferred: inclusion of antibiotics, ionophores or probiotics and the addition of enzymes.

The preference for the inclusion of synthetic amino acids was mixed among respondents.

Intangible feed attributes. Intangible attributes associated with the feed ingredient supplier were assessed; the level of preference associated with supplier(s) of animal protein products is listed in Table 2.

Despite the preference for these attributes, the maximum WTP was between \$1 and \$10 per ton. The maximum WTP for delivery during crisis was \$10-20 per ton. Most respondents were unwilling to pay any additional price for the attributes.

The same method used in calculating unconditional and conditional values of tangible product characteristics was used to calculate similar values of intangible product characteristics. The weighted sum of the unconditional value of the 10 intangible product characteristics shown in Table 2 was \$13.11 per ton, and the weighted sum of the conditional value of these intangible product characteristics was \$51.67 per ton.

Summary

Key findings from the study were:

- Most of the respondents had authority for feed formulation and purchasing decisions. Most had been in their current jobs for more than 10 years.

- Traditional and antibiotic-free diets ranked high in importance to respondents. Interest in vegetarian diets was only somewhat important, and non-genetically modified organism and organic/natural diets were largely unimportant to the participants.

- Key factors associated with choosing a feed ingredient were cost, uniformity, consistency, quality, on-time delivery, microbial control and the presence of preservatives.

- Major challenges concerning feed ingredients were amino acid availability, competitive pricing, uniformity, bin space, improvement in bird performance, on-time delivery and microbial control.

- The value of prophylactic antibiotic use and the value of synthetics were ranked important to very important by the majority of respondents.

- Characteristics such as microbial control, feed preservatives, nutritional efficiency, high nutrient density, low nutrient variability, amino acid availability, extended shelf life, decreased oxidation of fats, decreased denaturing of proteins, consistent moisture levels, safe and effective flow agents and uniformity/consistency of nutrient density were ranked important to very important for feed grains and dried distillers grains, soybean meal, meat and bone meal, poultry meal, fish meal and protein supplements. However, the maximum WTP associated with any individual characteristic of these feed ingredients was, at most, \$5-10 per ton extra.

- Unconditional value (all buyers, irrespective of WTP) and conditional value (only buyers indicating a WTP more than zero) of a supplement containing all tangible product attributes assessed were \$46.81 and \$94.22 per ton, respectively.

- Attributes associated with suppliers of animal protein products such as a decrease in feed mill downtime, accurate product information, technical information, technical assistance, product availability, short lead time for delivery, prompt customer service, accurate and timely invoicing, just-in-time delivery and delivery during a crisis were either preferred or highly preferred by the participants. Despite the preference for these attributes, typically the maximum WTP for any of these individual characteristics was \$1-10 per ton.

- Unconditional value and conditional value of a supplement containing all intangible product attributes assessed were \$13.11 and \$51.67 per ton, respectively. ■