

Broiler Feed Quality and Efficiency Are Significantly Improved by Precise Ingredient Moisture Control in the Mixer

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Introduction:

Previous process moisture control studies conducted at Kansas State University showed a very strong correlation between cold mash moisture content in the mixer and finished pellet quality, as measured by the standard Kansas State University Pellet Durability Index (PDI). A summary of these data is presented graphically in Figure 1.

When these data were presented to the feed industry several concerns were expressed. Among them are:

1. While conceding the better pellet, extra moisture content was thought to reduce feed conversion, making the process economically nonviable.
2. Large integrated producers would have to haul more weight per unit of nutrition.
3. Commercial feed companies believed that moisture addition in feed manufacturing was fraudulent and "did not want to sell water" to their customers.
4. Various schemes for moisture addition had been tried and "did not work".
5. It was thought that all the moisture necessary for feed processing could be obtained from steam in a conditioner.
6. Little or no data existed correlating pellet quality directly to livestock performance. Therefore an economic incentive for improving pellet quality was not obvious.

This broiler feeding trial was conducted with these concerns in mind.

Objective:

To determine the effect of precisely controlled ingredient moisture content in the mixer on broiler feed quality and subsequent bird performance for both mash and pelleted feeds.

3 to 6 Weeks

Feed	Live Wt (g) Gain	Feed Efficiency* (As Fed)	Feed Efficiency* (100% Dry Matter)	Mortality (%)
Mash Grower (L)	1456 ^b	1.86 ^a	1.74 ^c	2.01 ^b
Mash Grower (H)	1412 ^c	2.05 ^c	1.75 ^c	2.48 ^b
Pellet Grower (L)	1559 ^a	1.84 ^a	1.70 ^b	5.99 ^a
Pellet Grower (H)	1542 ^a	1.94 ^b	1.65 ^a	4.89 ^a

0 to 6 Weeks

Treatment	Live Wt (g) Gain	Feed Efficiency* (As Fed)	Feed Efficiency* (100% Dry Matter)	Mortality (%)
Mash (L)	2089 ^b	1.69 ^b	1.58 ^c	4.72
Mash (H)	2043 ^c	1.85 ^d	1.57 ^c	5.21
Crumble/Pellet (L)	2225 ^a	1.66 ^a	1.53 ^b	7.64
Crumble/Pellet (H)	2186 ^a	1.71 ^c	1.51 ^a	7.78

^{a,b,c,d} Means within a column with no common superscript differ significantly (P < 0.05)

* Feed Efficiency Computations:

Data are presented both "as fed" and 100% dry matter basis.

Discussion:

It is common for poultry feed efficiencies to be calculated "as fed", which works well when the feeding programs being compared have essentially identical moisture contents. In this study the treatment increased moisture content approximately 100% compared to the control, making an "as fed" comparison meaningless. The true nutritional value and cost of the feed are in the dry matter. Therefore feed efficiency comparisons are based upon 100% dry matter.

Conclusions:

1. Increasing cold mash moisture content in the mixer produced a much more durable pellet, as determined by both standard and modified KSU PDI methods. If the modified PDI procedure is predictive of pellets surviving a journey from the pellet die to the birds, the high moisture grower pellet was nearly twice as likely to arrive intact (80.8% vs. 42.6%) as the low moisture pellet.

2. A crumble produced from a pellet having a higher moisture content - PDI did not demonstrate a feeding benefit during the first three weeks. The high moisture feed showed a 3.3% decrease in gain and an identical feed efficiency compared to the dry feed. However since the high moisture feed had a nutritional density approximately 7% less than the dry feed, a positive technical effect was observed.
3. Pelleting improved feed efficiency over the corresponding mash feed by 4 points (2.3%). The nutrient densities of the two feeds were essentially identical.
4. Figure 2 graphically presents the correlations observed between the modified and standard KSU PDI and the 3 to 6 week feed efficiency. The data plotted as "0" PDI were the two mash feeds.

The pellet having a higher moisture content - PDI improved feed conversion 5 points (2.9%) during the 3 to 6 week grower period over the low moisture pellet.

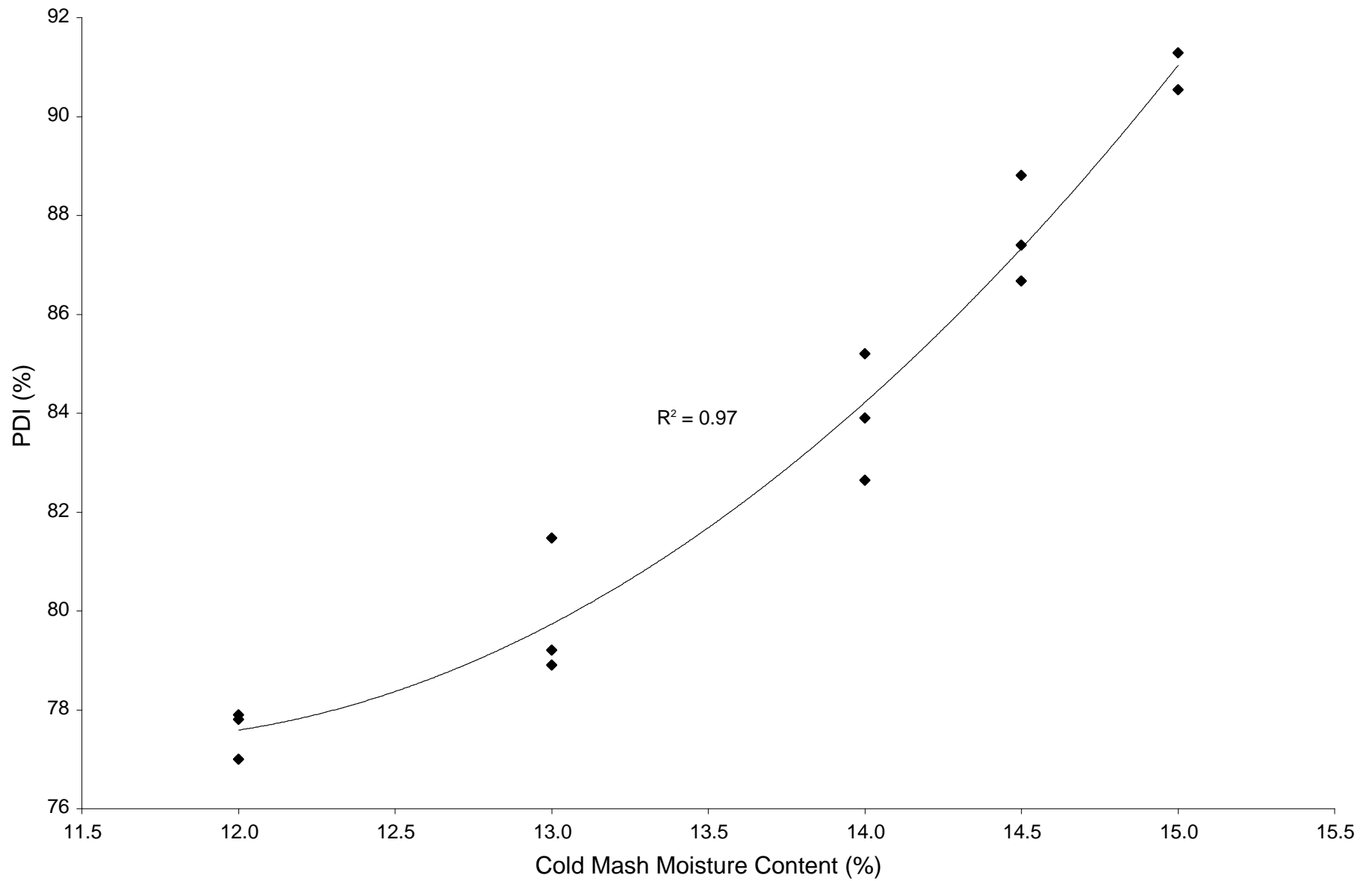


Figure 1: Correlation between Standard KSU PDI (%) and Ingredient Mash Moisture Content in the Mixer

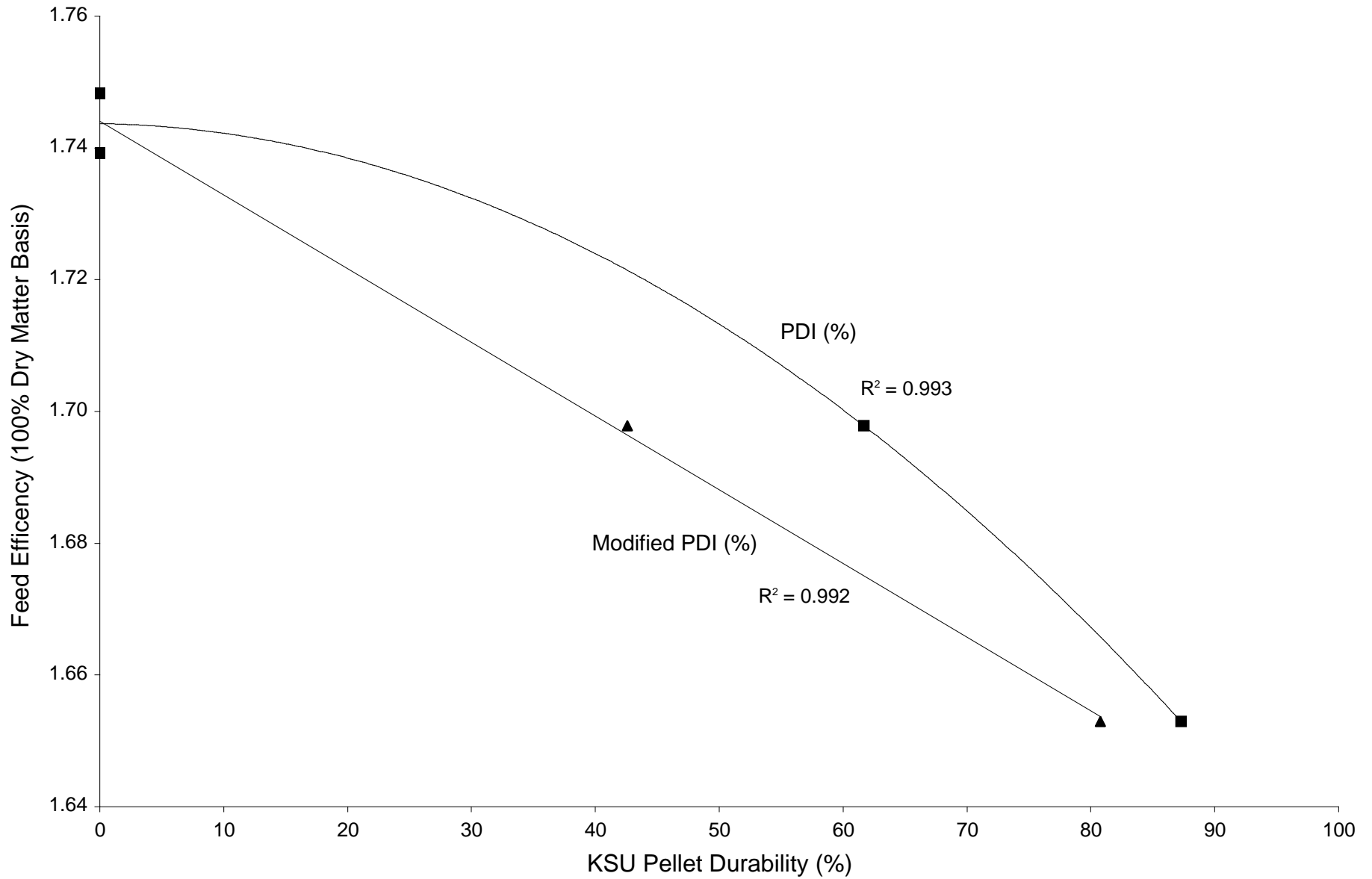


Figure 2: Correlation between PDI, Modified PDI and Broiler Feed Efficiency during the 3 to 6 Week Feeding Period