

BORREGAARD

PREDICTING FARM FINES IN TURKEY FINISHER PELLETS

PURPOSE

To document and compare the ability of 1% Ameri-Bond 2X or 10% wheat to improve pellet durability and reduce fines delivered to the turkeys.

RESULT

- Pellet durability was increased from 77.0 to 86.0 and 81.4 with 1% Ameri-Bond 2X and 10% Wheat, respectively. Fines off the tumbler were 23.0, 14.0, and 18.6%.
- Fines delivered to the turkeys were reduced from 21.3% to 9.7 and 15.1% with 1% Ameri-Bond 2X and 10% Wheat, respectively.
- Pellets made with Ameri-Bond 2X had less segregation (Figure 2).

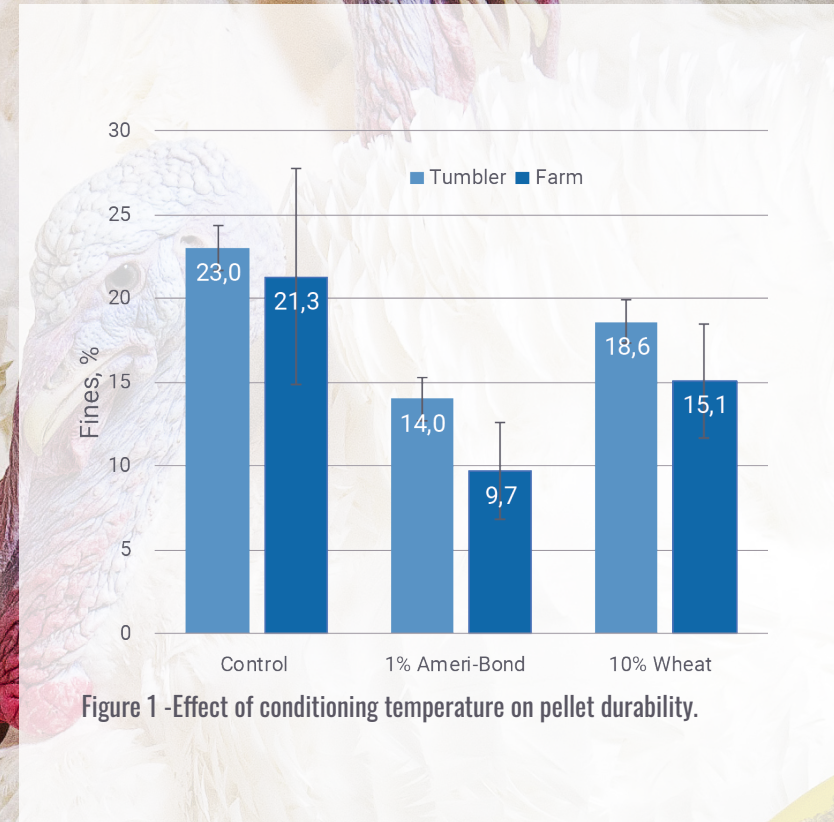


Figure 1 -Effect of conditioning temperature on pellet durability.

BORREGAARD PROCEDURE

A corn/soya-based Turkey Finisher diet (Weeks 18 – 20) was used for this investigation. Two tons each were mixed for Control, 1% Ameri-Bond 2X, or 10% Wheat replacing corn. Pellets were made on a 300 HP CPM 7122-2 press, fitted with a 3/16" by 2.5" die with staggered relief. Conditioning temperature and press amperage were monitored by Rustrak recording meters. Conditioning temperature was kept constant at about 80°C. The production rate was constant for all treatments.

Samples were collected off the cooler, weighed, and screened over a U.S. No. 6 sieve to determine the percentage of fines. The sieved pellets were tested for durability using the Tumbling Can method (A.S.A.E. Standard S 269.1); 500-g of pellets were tumbled for 10-minutes at 50 rpm and then screened over a U.S. No. 6 sieve to determine the percentage of pellets surviving and fines generated.

Pellets were transported to the top of the building where they passed through the fat-coater. Samples of pellets were collected as they left the fat-coater, sieved, and percentage of fines determined. Pellets were then loaded into a bulk truck and transported to the farm. Samples were collected from the spout as the truck unloaded the pellets into the farm silo. The silo was then unloaded into bags, and every 10th bag was sieved to determine the percentage of fines delivered to the farm.

This report describes only the Turkey Finisher ration. Grower I and Grower II rations were tested in like manner, with similar results.



BORREGAARD DATA

Table 1 - Summary of pellet quality measures

Quality measure:	Control	1% Ameri-Bond	10% Wheat
Tumbler durability, PDI	77.0 ± 1.3	86.0 ± 1.3	81.4 ± 1.3
Tumbler fines, %	23.0 ± 1.3	14.0 ± 1.3	18.6 ± 1.3
Cooler fines, %	12.6 ± 2.9	7.8 ± 4.3	6.6 ± 1.0
Fat-coater fines, %	18.7 ± 1.2	11.6 ± 1.2	16.0 ± 1.2
Truck unloading fines, %	22.2 ± 13.5	11.2 ± 3.9	17.2 ± 2.5
Silo outlet fines, %	21.3 ± 6.4	9.7 ± 2.9	15.1 ± 3.4

Table 2 - Fines in Turkey Finisher exiting the silo

Bag #	Control	1% Ameri-Bond
10	21.3	8.0
20	11.9	8.5
30	13.0	5.9
40	9.8	14.8
50	24.4	11.1
60	15.2	10.6
70	15.9	5.6
80	20.2	12.6
90	25.9	--
100	32.2	--
110	40.0	--

Table 3 - Durability and farm fines for four feeds

Week	Treatment	PDI	100 - PDI	Farm fines, %
11-14	Control	87.8	12.2	--
11-14	1% AmBd	93.6	6.4	9.8
11-14	2% AmBd	93.8	6.2	9.8
14-16	Control	94.5	5.5	6.9
14-16	1% AmBd	93.3	6.7	6.8
14-16	2% AmBd	95.2	4.8	4.4
16-18	Control	89.3	10.7	9.7
16-18	1% AmBd	93.3	6.7	7.4
16-18	2% AmBd	94.6	5.4	5.5
18-20	Control	77.0	23.0	21.3
18-20	1% AmBd	86.0	14.0	9.7
18-20	2% AmBd	88.7	11.3	11.3
18-20	10% Wheat	81.4	18.6	15.1

BORREGAARD DISCUSSION

This investigation was performed to determine how by the inclusion of either 1% Ameri-Bond 2X or 10% Wheat into a Turkey Finisher diet would impact pellet durability and the amount of fines delivered to the turkeys. Sampling was conducted at multiple points to identify elements in the process that might be particularly damaging to pellet quality. The single largest increase in fines occurred between the cooler and the exit of the fat-coater. This would include the stress applied by travelling up the vertical leg and also the mixing action in the coater. Fines levels were fairly stable after that point.

The Control feed had only slightly more fines than that with 1% Ameri-Bond 2X as the silo was initially unloaded, averaging about 8% and 12%, respectively (Figure 2). Half way through the unloading, Control fines began to increase, and finally ended at over 40%. Fines from the Ameri-Bond 2X were consistent at about 11%. Segregation occurred with Control pellets because fines do not flow as easily as pellets. This segregation was not only physical, but also nutritional. When the fines pass through the fat-coater they absorb a higher amount of fat due to their greater surface area. Thus, the Control diet was imbalanced by the segregation that occurred.

This process was repeated in 13 different rations (Table 3). In this case, the percentage of fines off the tumbler (100 – PDI) was a good predictor of the amount of fines that were delivered to the farm (Figure 3). It is common to hear people express frustration with pellet durability tests, saying they do not predict the amount of fines that will be seen in the field. That frustration occurs because too few samples are collected at the farm and there is a wide variation in the fines at any given moment because of segregation. When multiple samples are taken, the correlation is good. Pellet durability tests cannot predict the exact amount of fines that will be delivered to the farm, but they can predict the relative amount; pellet with high durability will deliver fewer fines. Pellets with high durability will reduce segregation of fines and nutrients.

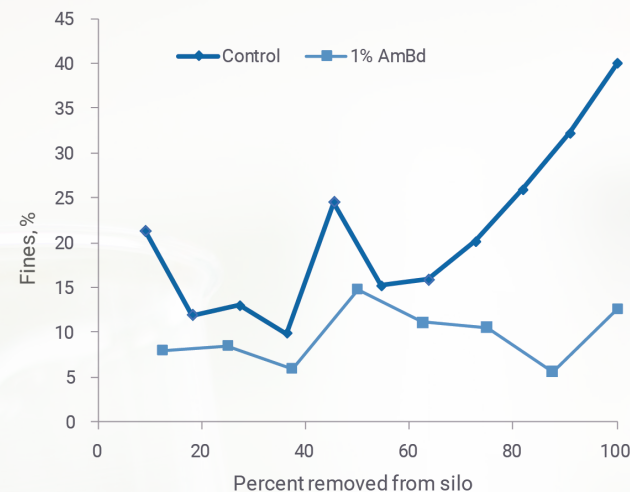


Figure 2 - Impact of 1% Ameri-Bond on fines exiting the silo.

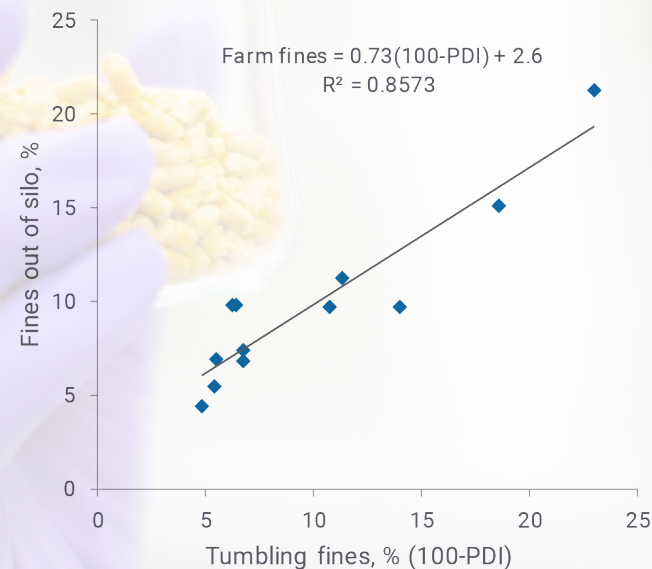


Figure 3 – Correlation between fines off tumbler and out of the silo.

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CONCLUSIONS AND RECOMMENDATIONS

- Use of 1% Ameri-Bond 2X reduced fines at the farm by 55%, dropping from an average delivered fines of 21.3% to 9.7%.
- Pellet durability was improved more by adding 1% Ameri-Bond 2X than formulating in 10% wheat; PDI values were 86.0 and 81.4.
- The Tumbling Can durability method was, in this case, a good predictor of fines delivered to the farm.

THIS WORK WAS PERFORMED AND REPORTED BY BORREGAARD

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