Feed quality drives performance and profitability. Practical approach

Is not just about quantity, it is about quality

Jorge Estrada, PhD

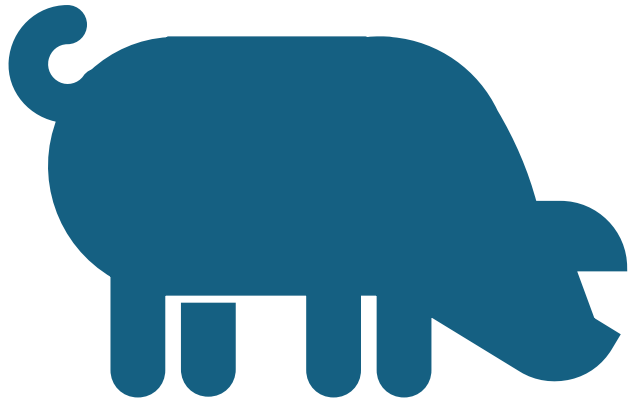
CARTHAGE NUTRITION

Take Home Messages

- Feed represents the largest cost in pork production. All efforts are compromised if feed quality is not properly monitored.
  - Feeding one pig = $85/pig
  - Feeding 100k pigs = $8,500,000.00

- Performance and profitability are the ultimate measures of success. Any opportunities in this area should include feed quality as a key checkpoint

- Tools like NIR, Power BI, and rapid test kits enable the implementation of a practical yet comprehensive feed quality program



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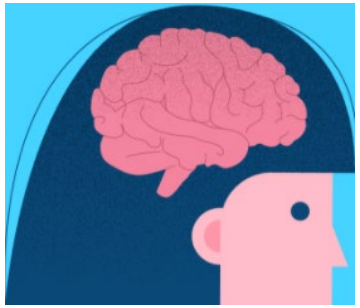
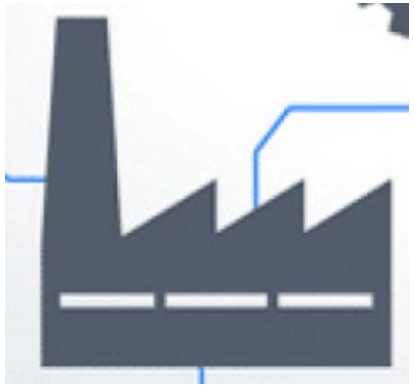
What is a Quality Assurance Program?

Coherence








Key Points of Control:

- Formulation Quality and Accuracy (batching sheets)

- Quality of ingredients
  - Nutrients (CP, Fat, Fiber, Minerals, etc)
  - Mycotoxins
  - Contaminants: physical (debris, minerals, water, etc) and pathogens (mold, bacteria, viruses)

- Manufacturing
  - Order of addition of ingredients
  - Micro table and hand-adds
  - Medication addition
  - Cross contamination
  - Mixing quality (Mixer test)
  - Scale calibration and invoicing method (theoretical vs actual)

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Formulation Quality and Accuracy (batching sheets)

Good Mix	PO#	PO Vendor	PO Branch	PO Owner	P
No (manually change to Yes)	110977	[redacted]			8

Ingredient	Product Code	Mix Weight Per Ton	Invoice Weight Per Ton	Total Mix Weight	Total Invoice Weight	Weight Variance	Tolerance	Bid Price	Invoice Price
Corn	Corn	1527.20	1539.53	18326.40	18474.40	0.81%	5.00%	$0.0706 per lbs	$0.0706 per lbs
Soybean Meal	Soybean Meal	397.00	400.70	4764.00	4808.41	0.93%	5.00%	$0.1497 per lbs	$0.1497 per lbs
Calcium Carbonate	Calcium Carbonate	19.50	19.62	234.00	235.40	0.60%	8.00%	$0.0408 per lbs	$0.0408 per lbs
Salt	Salt	12.00	12.20	144.00	146.40	1.67%	5.00%	$0.0490 per lbs	$0.0490 per lbs
Fat	Fat	10.00	10.00	120.00	119.95	-0.04%	5.00%	$0.6875 per lbs	$0.6875 per lbs
Monocal Phos	Monocal Phos	8.00	7.97	96.00	95.60	-0.42%	7.00%	$0.4050 per lbs	$0.4050 per lbs
L-Lysine	L-Lysine	6.90	6.84	82.80	82.10	-0.85%	5.00%	$0.8704 per lbs	$0.8704 per lbs
Salcurb	Salcurb	6.50	6.44	78.00	77.28	-0.92%	5.00%	$0.8980 per lbs	$0.9220 per lbs
Magnesium Oxide	Magnesium Oxide	5.00	5.00	60.00	60.02	0.03%	5.00%	$0.4094 per lbs	$0.4099 per lbs
PSM Finishing VTM w/Phy/TBCC	PSM Finishing VTM w/Phy/TBCC	3.00	2.99	36.00	35.90	-0.28%	7.00%	$1.9680 per lbs	$1.9680 per lbs
L-Threonine	L-Threonine	2.40	2.41	28.80	28.90	0.35%	8.00%	$1.0300 per lbs	$1.0300 per lbs
DL-Methionine	DL-Methionine	1.60	2.07	19.20	24.80	29.17%	6.50%	$1.4111 per lbs	$1.4111 per lbs
L-Valine	L-Valine	0.50	0.50	6.00	6.02	0.33%	8.00%	$1.4317 per lbs	$1.4317 per lbs
L-Tryptophan	L-Tryptophan	0.40	0.40	4.80	4.82	0.42%	10.00%	$3.7698 per lbs	$3.7698 per lbs

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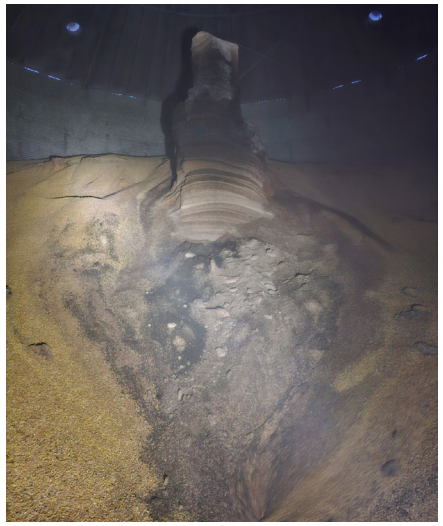
Unit 5
1483
Unit 5
3-11-25
Unit 4
1493



	Formulated	Analyzed (diet with good corn)	Analyzed (diet with bad corn)
	Lactation	Lact 2-19-25	Lact 2-17-25
Moisture	13.19	13.98	14.26
Protein	19.03	19.60	18.60
Fat	4.63	4.26	4.39
NDF	8.19	6.90	6.20
Ash	5.92	4.70	5.93
Phosphorus	0.41	0.53	0.60
Potassium	0.78	0.94	1.00
Calcium	0.80	0.71	1.04
Sodium	0.24	0.24	0.28
Iron	207	190	290
Maganese	63	69	91
Copper	23	28	23
Zinc	154	126	157

WARNING:
It can be very hard to identify quality on paper

Mycotoxin Screen by LC-MS/MS

Identification	Specimen	Analyte	Result
		Feed	Aflatoxin B1	< 10 ppb
			Aflatoxin B2	< 10 ppb
			Aflatoxin G1	< 10 ppb
			Aflatoxin G2	< 10 ppb
			Deoxynivalenol	= 0.5 ppm
			3-Acetyl Deoxynivalenol	< 10 ppb
			Fumonisin B1	= 0.1 ppm
			Fumonisin B2	< 0.2 ppm
			Ochratoxin A	< 10 ppb
			T-2	< 10 ppb
			HT-2	< 10 ppb
			Zearalenone	= 0.4 ppm
			-Zearalenol	< 200 ppb

Comment

Mycotoxin Screen by LC-MS/MS

Identification	Specimen	Analyte	Result
		Feed	Aflatoxin B1	< 10 ppb
			Aflatoxin B2	< 10 ppb
			Aflatoxin G1	< 10 ppb
			Aflatoxin G2	< 10 ppb
			Deoxynivalenol	= 0.3 ppm
			3-Acetyl Deoxynivalenol	< 10 ppb
			Fumonisin B1	= 0.4 ppm
			Fumonisin B2	< 0.2 ppm
			Ochratoxin A	< 10 ppb
			T-2	< 10 ppb
			HT-2	< 10 ppb
			Zearalenone	< 0.2 ppm
			-Zearalenol	< 200 ppb

Comment

Key Points of Control (Cont.):

- Feed quality – at mill level
- Biosecurity protocols
- Delivery accuracy
- Feed quality – at feeder level

			Calcium, %		Sodium, %	
Date Sample	Diet	Site	Formulat	Analyze	Formulat	Analyze
6/28/2023	N3	1	0.57	1.05	0.28	0.25
8/12/2023	N3	2	0.57	0.22	0.28	0.31
9/21/2023	N3	3	0.57	0.30	0.28	0.08
		Average	**0.57**	**0.52**	**0.28**	**0.21**
		Diff. from Target, %		**-8.2**		**-23.8**
8/5/2023	F1	1	0.53	0.23	0.28	0.06
8/5/2023	F1	2	0.53	0.33	0.28	0.13
9/21/2023	F1	3	0.53	0.32	0.28	0.08
		Average	**0.53**	**0.29**	**0.28**	**0.09**
		Diff. from Target, %		**-44.7**		**-67.9**
8/5/2023	F2	1	0.47	0.34	0.26	0.19
9/20/2023	F2	2	0.47	0.15	0.26	0.15
9/20/2023	F2	3	0.47	0.25	0.26	0.17
		Average	**0.47**	**0.25**	**0.26**	**0.17**
		Diff. from Target, %		**-47.5**		**-34.6**
9/20/2023	F3	1	0.41	0.25	0.24	0.12
9/20/2023	F3	2	0.41	0.20	0.24	0.13
9/21/2023	F3	3	0.41	0.11	0.24	0.05
		Average	**0.41**	**0.19**	**0.24**	**0.10**
		Diff. from Target, %		**-54.5**		**-58.3**
9/21/2023	F5	2	0.44	0.13	0.23	0.06
9/21/2023	F5	3	0.44	0.27	0.23	0.12
		Average	**0.44**	**0.20**	**0.23**	**0.09**
		Diff. from Target, %		**-54.5**		**-60.9**

Issues with salt flowing at the mill,
why don't we just use a coarse source?

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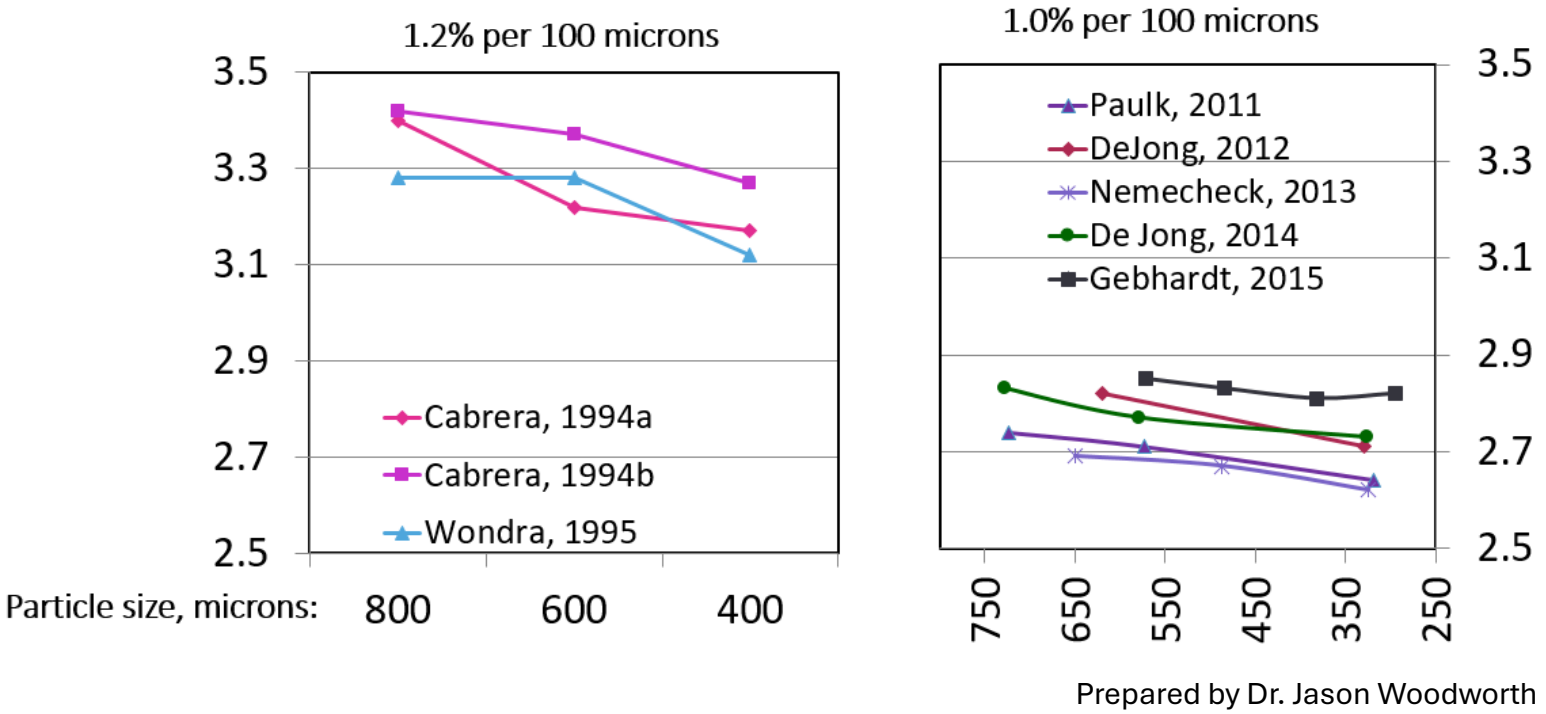
Landing Dollars!



Prepared by Dr. Jason Woodworth

- 100 Microns worth 1% feed conversion
- WTF pig feed ~670 lb
- Feed cost ~$0.11/lb
- $0.74/pig
  - In 100k pigs = $74,000

Prior example from mill in IA: particle size, no sodium, OOF events, lack of fat addition: ~ $5.00/pig
Those pigs ad a 7% higher FCR and poor ADG

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Monitoring at Feeder level

% of Expectation

Values

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Carthage Nutrition Nutrient Summary

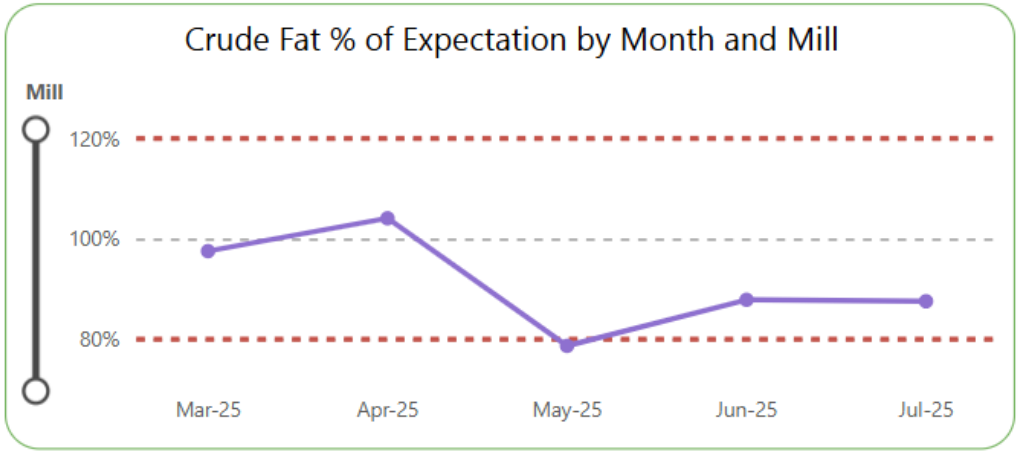
Feed Mill Type

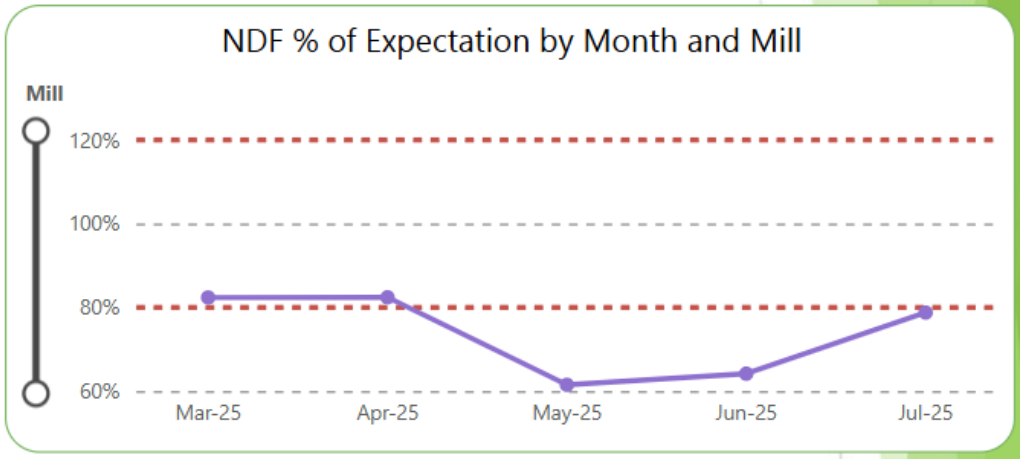
Fin

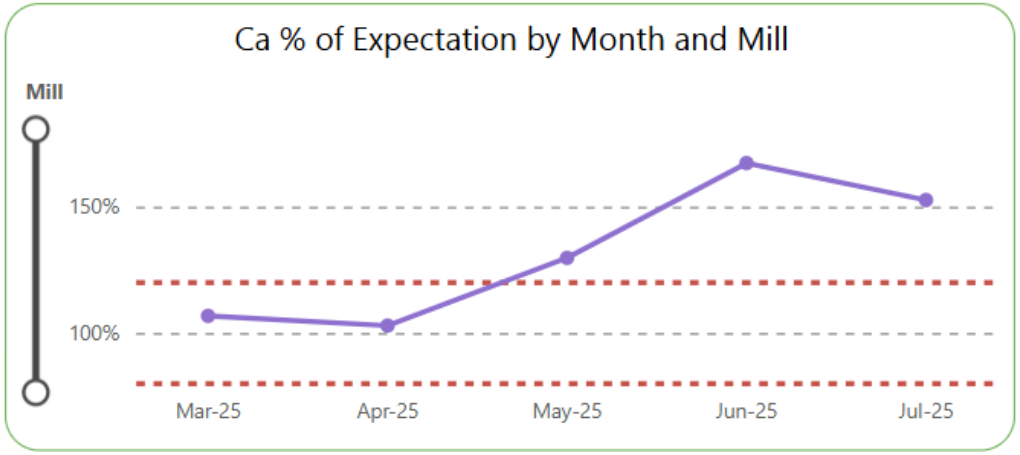
Producer All

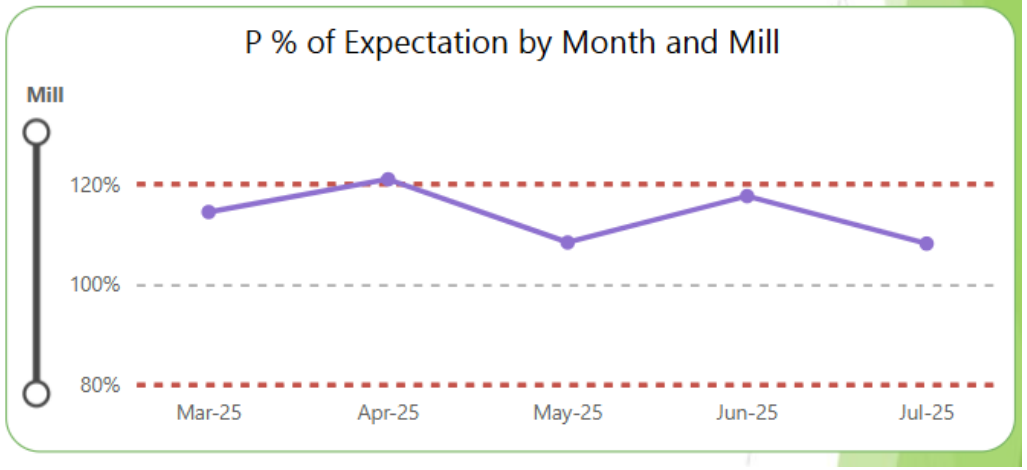
Mill All

Diet or ingred All









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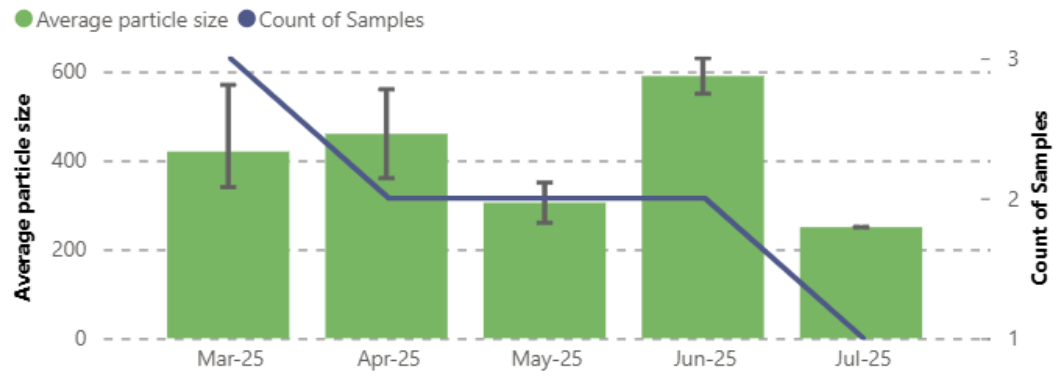
Mar-25 : Jul-25

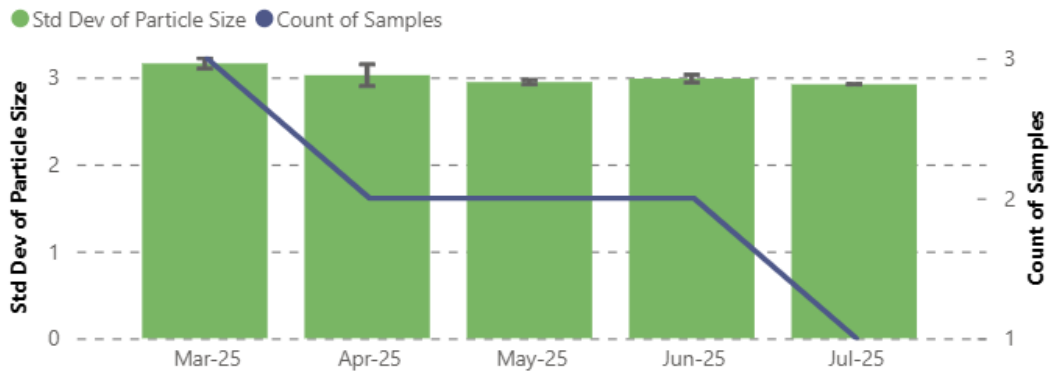
Carthage Nutrition
Feed Quality Assurance

Feed Mill Type: Fin

Particle Size by Month

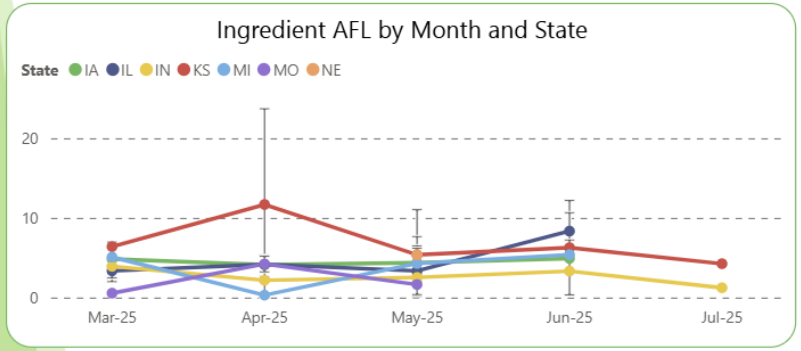


Std Dev of Particle Size by Month

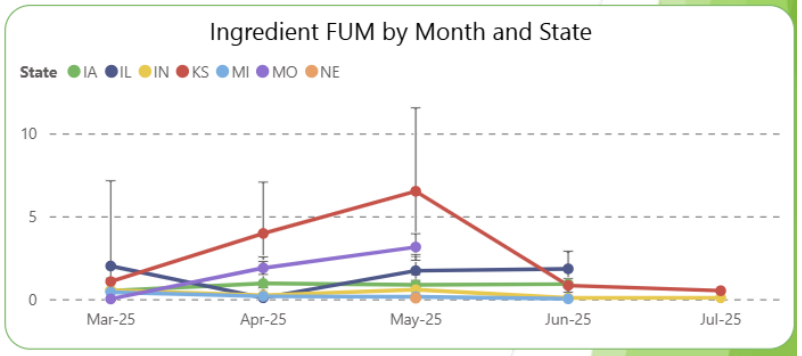


Corn Mycotoxins

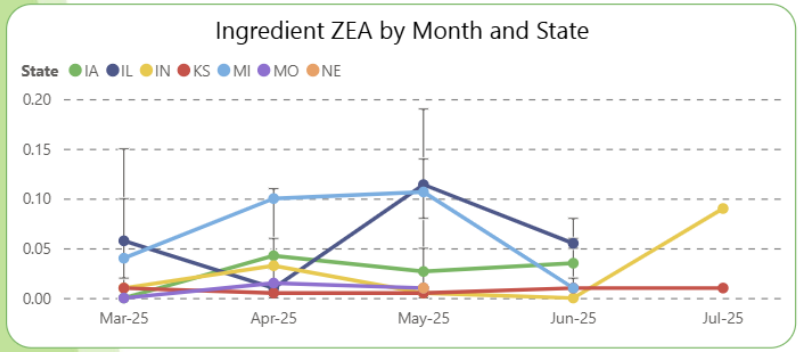
Ingredient AFL by Month and State



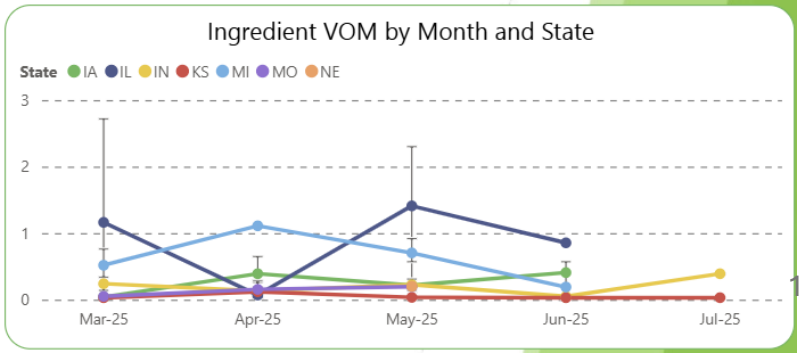
Ingredient FUM by Month and State



Ingredient ZEA by Month and State



Ingredient VOM by Month and State



Summary: Basic Components

1

Formulation

Monitoring accuracy of batching sheets and ingredient prices.

2

Ingredients

Nutrients: use of NIR as main tool and wet chemistry as needed

Mycotoxins: ELISA and rapid kits

3

Manufacturing

Mixer test at least once/year (twice/year is expected)

Daily feed meds inventory reconciliation

Flushing and production order

Scale calibration certificate (carried out by 3rd party).

4

Feed quality

Mill **retaining samples** (6 months)

Feed tickets and delivery accuracy

Feed samples (collected from **feeder**) tested with wet chemistry once/month/mill

5

Expected cost of the program

¢2–5/pig

100k pigs/year
$5,000

THE END

Thank You

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