

# Broiler nutrition and feed management



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# Presentation outline



- **Feed management**
- **Energy and protein**
  - Energy study
  - Diet nutrient levels
- **Feeding in hot climate**
- **Ingredients**
  - Molds/mycotoxins
  - Densimetric tables



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# Feed management

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# Feed management



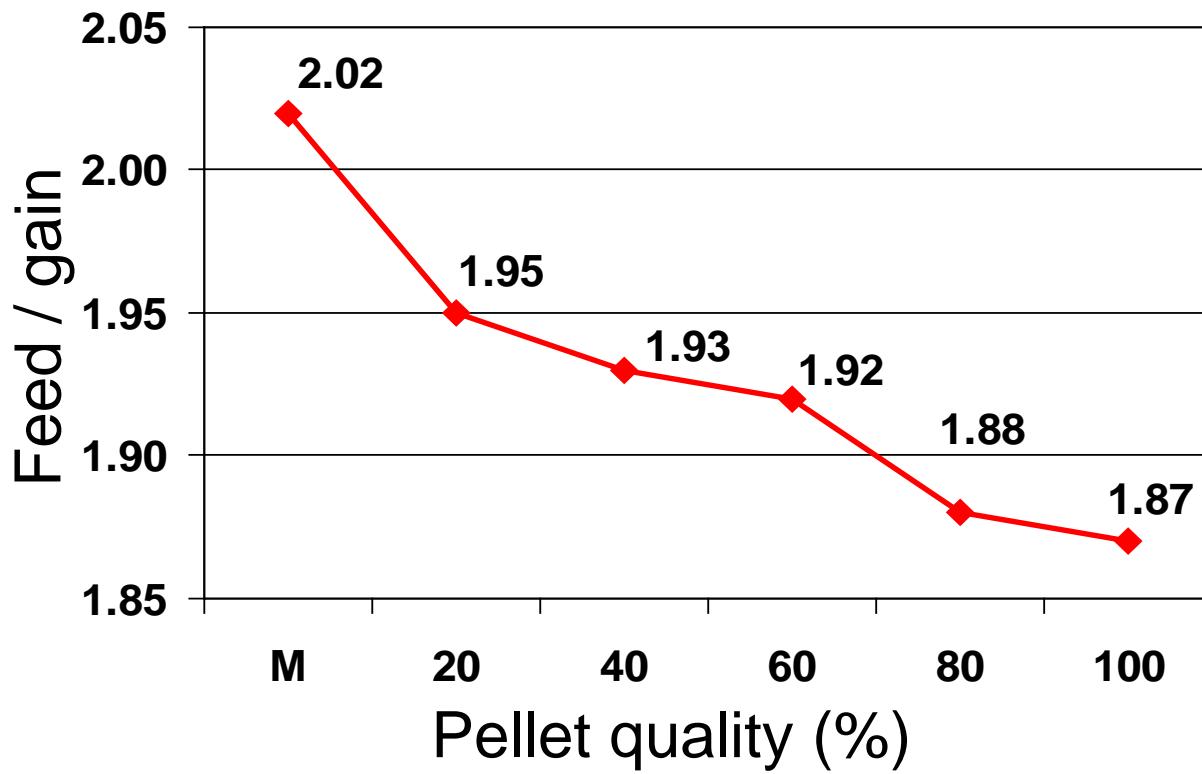
- **When is the best FCR?**
  - Chick is “cold” blooded the first 5 days
  - No heat production
  - Best FCR first few days, can be <1
  
- **Amount of feed put down at start**
  - 70gr of feed/bird on paper



# Feed management



- Pellet quality



- Caloric value and behaviour



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# Energy Study

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# Energy study



- Performed by Dr. Dozier at Auburn university
- Four phases (Starter, grower, finisher, withdraw)
- Still on going (38-56days and total period)
- Four different energy levels per phase
- Two different amino acid levels per phase



# Energy study



- Two most expensive parts of feed: Energy and Protein.
- Energy and protein are highly correlated in feed for broiler performance.
- Since 1986 feed energy has been lowered by 60-80 kcal/kg.

	1989	2014
Starter (kcal/kg)	3130	3039
Grower (kcal/kg)	3174	3112
Finisher (kcal/kg)	3218	3165
Withdraw (kcal/kg)	3262	3218



# Energy study, Starter (day 1- 14)



Energy level (kcal /kg)	BWG (g)	Feed intake (g)	FCR*
2931	453	611	1.333
2997	460	621	1.347
<u>3064</u>	457	622	1.340
3130	461	612	1.343
AA level % of Cobb	BWG (g)	Feed intake (g)	FCR*
92%	449 <sup>a</sup>	618	1.368 <sup>a</sup>
100%	<b>467<sup>b</sup></b>	615	<b>1.314<sup>b</sup></b>

\*Based on gain and adjusted for mortality

- No response to energy, clear effect of AA on FCR

# Energy study, Grower (day 14-32)



Energy level (kcal /kg)	BW (kg)	BWG (kg)	Feed intake (kg)	FCR*
2997	2.092	1.611	2.486	1.539
3064	2.059	1.582	2.447	1.548
<u>3130</u>	2.046	1.575	2.447	1.557
3196	2.057	1.586	2.435	1.536
AA level % of Cobb	BW (kg)	BWG (kg)	Feed intake (kg)	FCR*
92%	2.046	1.572	2.480	1.574 <sup>a</sup>
100%	2.081	1.605	2.428	<b>1.516<sup>b</sup></b>

\*Based on gain and adjusted for mortality

- Again no response on energy, AA show clear effect on FCR

# Energy study, Grower (day 14-32)



Energy level (kcal /kg)	Fat	Carcass	Fillet	Breast	White striping
2997	1.05	70.35	18.31	22.38	0.757
3064	1.08	70.48	18.12	22.50	0.703
<u>3130</u>	1.14	70.66	18.20	22.53	0.705
3196	1.19	70.97	18.34	22.31	0.900
AA level % of Cobb	Fat	Carcass	Fillet	Breast	White striping
92%	1.19 <sup>a</sup>	70.62	18.06 <sup>a</sup>	22.21	0.629
100%	<b>1.04<sup>b</sup></b>	70.61	<b>18.42<sup>b</sup></b>	22.65	0.649

Yield expressed as percentage of live weight

White striping is a numerical number

- Higher energy tended to induce more white striping.
- Higher AA resulted in more fillet yield.

# Energy study, Finisher (day 28-42)



Energy level (kcal /kg)	BW (kg)	BWG (kg)	Feed intake (kg)	FCR*
3042	2.757	1.060	2.024	1.918 <sup>a</sup>
3108	2.696	1.022	1.986	1.929 <sup>a</sup>
<u>3173</u>	2.742	1.097	1.991	<b>1.825<sup>b</sup></b>
3240	2.724	1.069	1.958	<b>1.821<sup>b</sup></b>
AA level % of Cobb	BW (kg)	BWG (kg)	Feed intake (kg)	FCR*
92%	2.714	1.042	2.008	1.919
100%	2.745	1.082	1.971	1.828

\*Based on gain and adjusted for mortality

- FCR improved with higher energy levels, only a trend in AA.

# Energy study, Finisher (day 28-42)



Energy level (kcal /kg)	Fat	Carcass	Breast	White striping
3042	<b>1.06<sup>a</sup></b>	72.76	23.62	0.654
3108	<b>1.11<sup>a</sup></b>	71.78	23.63	0.764
<u>3173</u>	1.36 <sup>b</sup>	72.14	23.48	0.764
3240	1.23 <sup>b</sup>	72.06	23.57	0.833
AA level % of Cobb	Fat	Carcass	Breast	White striping
92%	1.22	71.76	23.18 <sup>a</sup>	0.725
100%	1.16	72.61	<b>23.97<sup>b</sup></b>	0.794

Yield expressed as percentage of live weight

White striping is a numerical number

- Higher energy levels increased the amount of abdominal fat, higher tendency of white striping.
- Higher AA levels increased breast yield.

# Energy study



- Cobb 500's continue to show a consistent response in FCR and breast yield to amino acid levels
- Study shows that lower energy levels in early feeds give the same response as recommended energy levels; altering our recommendations

# Diet nutrient levels

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# Diet nutrient levels



- **Economic priorities**
  - Growth rate
  - Feed conversion
  - Feed cost per kg of live bird
  - Cost per ton of feed
  - Profitability through the processing plant
- **None of these are right or wrong, be aware of economic drivers**
  - Priorities will change with: housing availability, diseases, shift in feed costs, shift in finished product prices

# Diet nutrient levels



Starter	Low	Medium	<u>High</u>	Xhigh
ME (kcal/kg)	2984	2984	3041	3041
Protein (%)	19.01	21.02	22.01	23.02

Grower	Low	Medium	<u>High</u>	Xhigh
ME (kcal/kg)	3085	3085	3108	3108
Protein (%)	17.50	19.00	20.27	21.92

Finisher	Low	Medium	<u>High</u>	Xhigh
ME (kcal/kg)	3175	3175	3180	3180
Protein (%)	16.60	18.02	19.02	20.51

# Diet nutrient levels



- Feed costs per ton

	Low	Medium	<u>High</u>	Xhigh
Starter	\$411	\$426	\$442	\$457
Grower	\$405	\$417	\$429	\$446
Finisher	\$405	\$416	\$425	\$438

- Value

- Live bird \$1.20/kg
- Processed carcass \$1.76/kg
- Boneless breast \$4.41/kg

# Diet nutrient levels



- Economics for live bird market

	Low	Medium	<u>High</u>	Xhigh
FCR	1.82	1.81	1.80	1.79
\$/kg feed	0.407	0.418	0.429	0.443
\$/kg bird	0.740	0.757	0.772	0.793
Live weight	2.788	2.869	2.951	3.006
Feed \$/bird	2.06	2.17	2.28	2.38
Bird \$ Value	3.34	3.44	3.54	3.60
\$ Net	<b>1.28</b>	1.27	1.26	1.22

# Diet nutrient levels



	Low	Medium	<u>High</u>	Xhigh
Live bird - \$ Net	<b>1.28</b>	1.27	1.26	1.22
Processed bird - \$ Net	1.32	1.33	<b>1.40</b>	1.38
Boneless breast - \$ Net	2.91	3.05	3.17	<b>3.28</b>

- Changing bird value, decreased to 80%

	Low	Medium	<u>High</u>	Xhigh
Live bird - \$ Net	<b>0.61</b>	0.58	0.55	0.51
Processed bird - \$ Net	0.64	0.63	<b>0.66</b>	0.63
Boneless breast - \$ Net	1.91	2.00	2.07	<b>2.14</b>

# Diet nutrient levels



- Changing bird value, decreased to 80%

	Low	Medium	<u>High</u>	Xhigh
Live bird - \$ Net	<b>0.61</b>	0.58	0.55	0.51
Processed bird - \$ Net	0.64	0.63	<b>0.66</b>	0.63
Boneless breast - \$ Net	1.91	2.00	2.07	<b>2.14</b>

- Change soybean meal price, increased to 120%

	Low	Medium	<u>High</u>	Xhigh
Live bird - \$ Net	-	-	-	-
Processed bird - \$ Net	<b>0.47</b>	0.43	0.44	0.37
Boneless breast - \$ Net	1.74	1.80	1.85	<b>1.88</b>

# Diet nutrient levels



- Cobb recommendations give the best starting point
- Cobb 500 broilers respond to protein (FCR, growth, yield)
  
- ADG priority, Xhigh feed density
- FCR priority, Xhigh feed density
- Lowest cost per ton priority, lowest feed density
- Best feed cost per kg of bird, lowest feed density
- Live bird marker, lowest feed density
- Processed bird, high feed density (but watch soybean meal)
- Breast meat priority, Xhigh feed density

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# Feeding in hot climate

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# Feeding in hot climate



- First remember, you can not replace management with nutrition
- Excellent crumble / pellet quality required
  - 80% homogeneity at the hopper for crumble
    - 2.0-3.5mm screen, and start with a 4.37mm pellet diameter
  - 85% homogeneity at the hopper for pellets
- Extend to time of supplement feed on floor or lids
- Make sure the birds can eat at the coolest period of the day



# Feeding in hot climate



- **Lower the heat increment of feed**

- Use more fat calories (example: full fat soya)
  - Reduce passage rate, better digestion
- Lower the total protein (not ess. aa) in the diets (lower soybean meal)
- High costs with needed ingredients

- **Second approach, lower energy in the feed (<2950 kcal)**

- Opposite to first approach
- Creates more feed intake
- Requires a fiber diet

# Feeding in hot climate



- **50% of the sodium source should be bicarbonate**
  - Watch the chloride level that is doesn't go below 0.18%
- **At 10.5 birds/m<sup>2</sup>**

Bicarb	Weight (g)	Intake (g)	FCR
Without	2301	4959	2.174
With	<b>2372</b>	<b>4987</b>	<b>2.132</b>

- **At 13.5 birds/m<sup>2</sup>**

Bicarb	Weight (g)	Intake (g)	FCR
Without	2227	4788	2.162
With	<b>2296</b>	<b>4818</b>	<b>2.118</b>

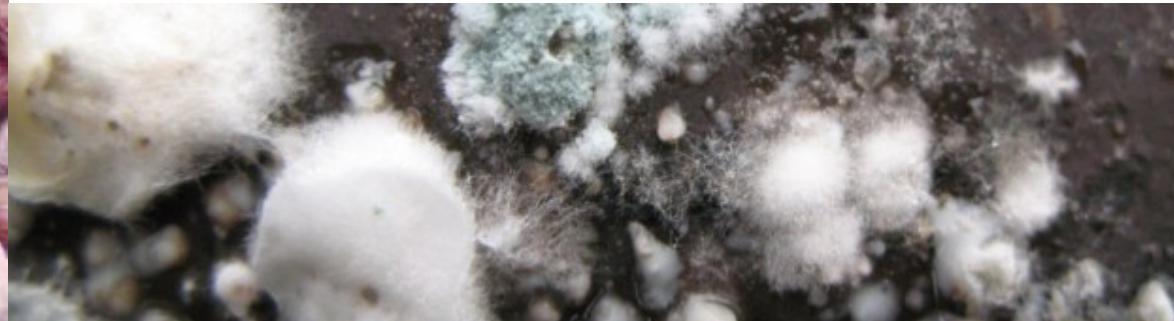
From Puron et al., 1997

# Molds and mycotoxins

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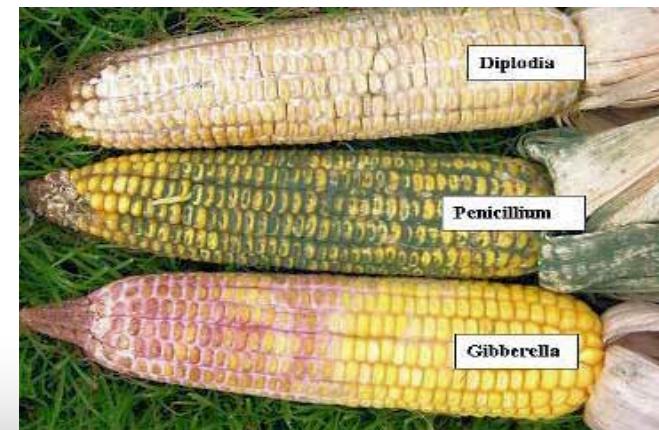
# Molds and Mycotoxins



# Molds and Mycotoxins



- Mycotoxins are produced by molds during mold growth
- Molds are primarily *Aspergillus* and *Fusarium*
- Toxins of main concern are Aflatoxin B1, Ochratoxin A, Trichothecenes (T2), Fumonisin B, DON, Zearalenone, Citrinin
- Molds can grow in the field, during storage (elevator terminal, feed mill, farm) while in grain form or in feed form
- Corn example
  - Less than 20ppb aflatoxin
  - 15.5% moisture or less
  - “Cool and sweet” upon arrival



# Molds and Mycotoxins



- Best prevention insistence on good quality grain
- Some products have been offered as relief:
  - Aluminosilicates
  - Zeolites
  - Bentonite
  - Bacteria and Enzymes (?)
- Try to segregate grain, if possible, and use good corn for breeder feeds and starter
- Do some testing and rejection in the mills
- Have a mill rotational bin cleaning program plus keep farm bins cleaned between flocks



# Densimetric tables

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# True Metabolizable Energy of Corn Fractions



Dale and Jackson (1994, J. Appl. Poultry Res. 3: 179- 183)

- Found that the TME of **broken kernels** was 2.5 percent less than whole kernels
- The TME of **foreign material** is 11% less than the whole kernels
- Hypothesized that broken kernels and foreign material would be more susceptible to mold and insect damage

# Densimetric Table



# Densimetric Table



# Densimetric Table



Selected corn



Table residue



# Densimetric Table



*Mycotoxin analysis from “broken” corn*

<i>Density</i>	<i>Aflatoxin</i> (ppb)	<i>Trichothecene</i> (ppb)
805	0	26
737	79	62
593	116	98

*Adapted from Silva et.al. 2008*

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Thank you, any questions?

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