Moisture, Litter and Performance

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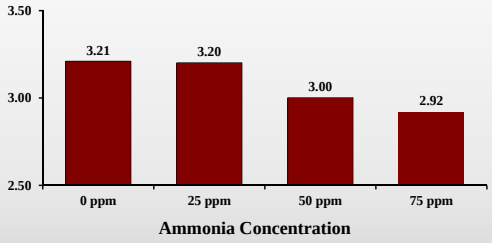
What is good litter quality?

Why do we care about litter moisture?

Live weight, 49 days



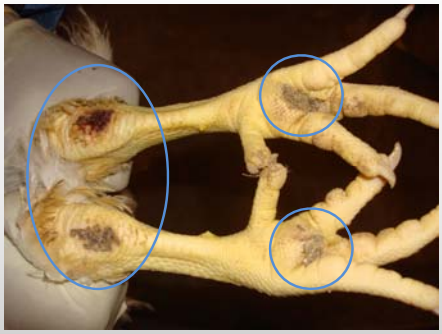
Miles et al., 2004

Poor litter conditions and disease

- Gangrenous dermatitis
- Necrotic enteritis
- Non-specific gastrointestinal disease
- Coccidiosis oocysts
- Salmonella
- Flies and rodents

Dermatitis

Animal welfare

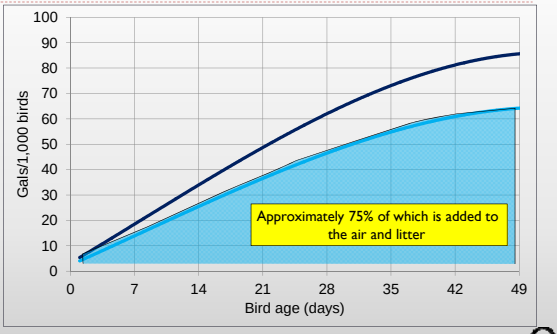


Sources of moisture & factors that affect litter moisture

Moisture sources: heating system

- Burning 1 gallon of propane (C_3H_8)
  - Produces 92,000 BTU's of heat
  - Produces 108 ft^3 (3.1m^3) of CO_2
  - Produces 0.82 gallons (3.1 L) of H_20
  - Consumes O_2 (850 ft^3 (24 m^3) of air)
  - If brooder/furnace is properly maintained, very little CO will be produced

Moisture sources: birds



Water added to the house per 1,000 birds

Moisture sources: drinker system

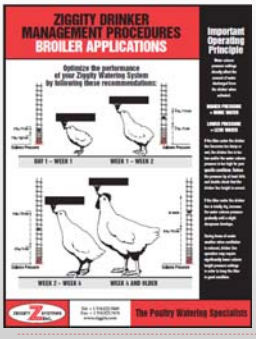
- One Key aspect of a drinker system is
  - Minimize water leakage
- Key Management

Drinker system

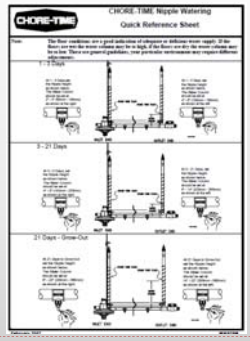
- 5 Drinker systems evaluated
  - Val
  - Choretime
  - Ziggity
  - Lubing
  - Plasson
- No differences in bird performance
- Litter under the drinker systems varied 28-47%

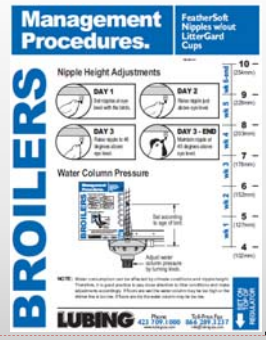
Cornelison et al, 2006

Manage drinkers by manufacturer's guidelines



All Drinker Systems have Guides



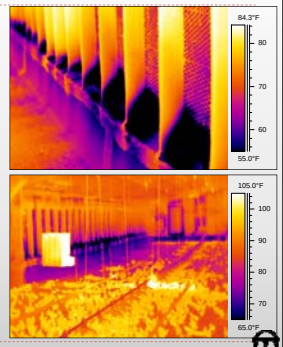


Drinker system

- What factors will affect litter moisture
  - Drinker height
  - Water pressure
  - Routine cleaning
  - Water quality
  - Worn nipples
    - Should be evaluated after 5 years for evidence of wear
    - Replacement has been reported to reduce cake litter volume 50-90%

House tightness

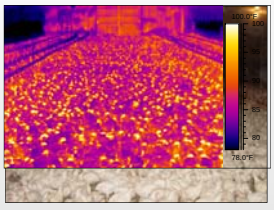
- Tunnel curtain tightness

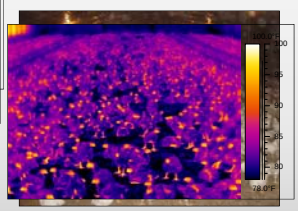


Bird density

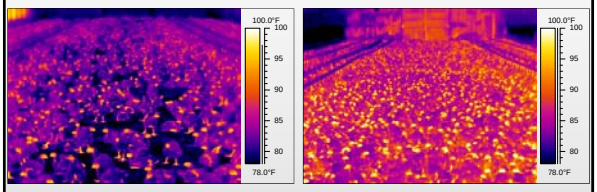
Feed and water space/access becomes a limiting factor

Another problem with increased density is increased heat stress





Which one is the pad end of the house?

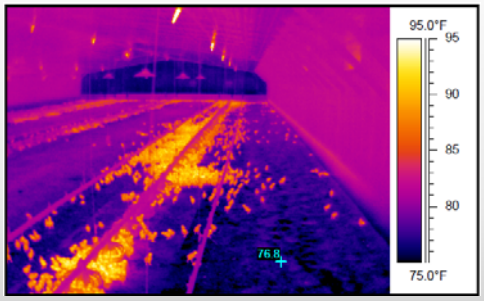


Air temperature is actually 4°F lower on this end of the house!

Litter quality

Wet floor leads to cooler floor temperature

Cool floor due to damp shavings



Moisture absorption & drying times

Bedding Material	Initial Moisture (%)	24h Moisture (%)	60min Moisture left (%)	120min Moisture left (%)
Peat moss	41.7	317.5	61.2	28.6
Fresh shavings	15.3	193.8	38.4	13.8
Used shavings	21.4	167.5	46.1	8.8
Rice hulls	9.9	104.5	24.4	2.2
Peanut hulls	14.3	174.9	21.3	1.3
Gypsum paper	11.2	121.4	26.8	9.7
Gypsum	9.3	40.2	41.7	12.4
Sawdust	5.0	196.9	52.3	24.8
Wheat straw	9.9	297.6	56.3	28.6

Litter depth

Litter depth

- Why do certain areas of the house "slick" over quicker than others?

>1.9cm

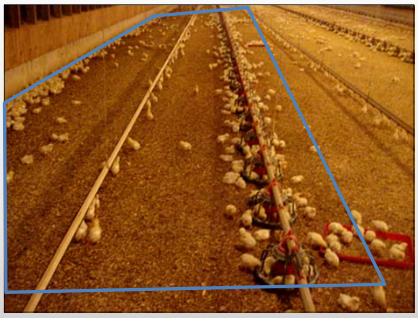
~4.5cm

>1.27cm

Litter depth

- Not enough material to absorb water

Litter quality variable across the house



Cooler floor temperatures

Litter depth studies

- Study 1: Pen trial with varying litter depths
  - 2.5, 7.6, 12.7 cm of used litter

- Study 2: Field trial with litter systems
  - 6 commercial broiler houses
    - 2 houses cleaned out
    - 2 houses windrowed
    - 2 houses caked out

Materials & methods

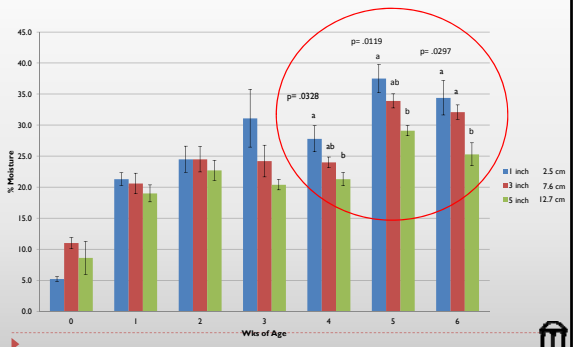
- Litter moisture sampled weekly
- Bird and feed weights on Days 0, 7, 21, 42
  - Feed consumption adjusted for mortality
- Paws scored weekly
  - 3 point scale (0-2) (Bilgili et al., 2006)

Field scoring system

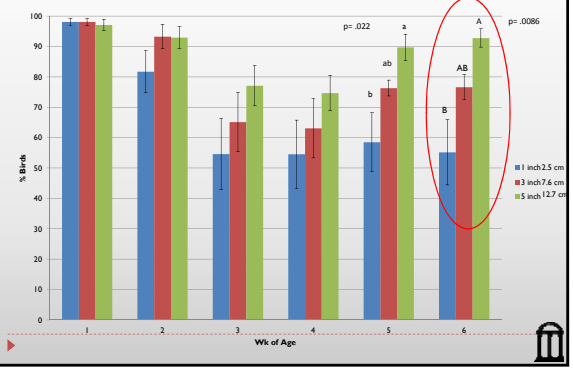
- 3 point visual ranking scale
  - 0= no lesions
  - 1= lesion <1cm diameter
  - 2= lesion >1cm diameter

  (Bilgili et al., 2006)
- Similar to plant grading
  - A= Score of 0
  - B= Score of 1
  - C & Condemn= Score of 2

Weekly moisture (%)



Paw score 0 weekly



Litter system study

- Field Trial with 6 commercial broiler houses
  - Comparison of different litter systems
    - Trt. 1- 2 houses cleaned out, fresh shavings added (2.5cm)
    - Trt. 2- 2 houses windrowed and spread back out (12cm
    - Trt. 3- 2 houses caked out (10.2)

Paw scores at plant (54d)

Plant	A grade	B Grade	C Grade	Condemn
Cleaned out	0	23.4	67.1	9.5
Windrow	4.8	63.9	23.5	7.8
Caked out	3.8	54.2	34.4	7.6

Summary of litter system study

- Completely cleaned out houses had worst paw quality, 75% Grade C or condemned
- Rapid deterioration of fresh litter dramatically reduced paw quality
  - Absorption capacity? Moisture removal?
- Built up litter systems resulted in the highest Grade A paws at the plant

Target Rh is typically between 50% and 70%

If moisture is not managed properly:

- Reduced litter quality
- Reduced litter treatment life
- Uneven water lines
- Reduced paw quality
- Breast blisters
- Reduced growth
- Poor feed conversion
- Increased disease susceptibility

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