On-farm hatching and early feeding of broiler chickens

Dr. Rose Molenaar – Postdoctoral Researcher
Adaptation Physiology Group - Wageningen

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My background

- PhD project, WUR, NL – *graduated 2010*
- Research Manager HatchTech, NL – *until 2013*
- Quality Assurance Manager, Australia – *until 2017*
- Postdoctoral Researcher WUR, NL – *until now*

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Roadmap of this presentation

1. Purpose of early feeding
2. Systems to apply early feeding
3. Nutritional aspects of early feeding
4. First results of our Healthy Livestock project

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Roadmap of this presentation

1. **Purpose of early feeding**
2. Systems to apply early feeding
3. Nutritional aspects of early feeding
4. First results of our Healthy Livestock project

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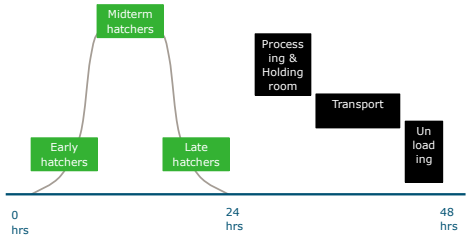
1. Purpose of early feeding

Timeline in commercial hatchery



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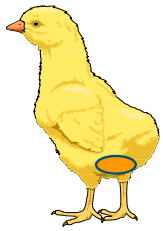
1. Purpose of early feeding

Residual yolk at hatch contains

- Water - 52%
- Protein - 20%
- Lipids - 18%
- Carbo+Ash - 10%

Is there an issue?



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Molenaar et al., 2010

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1. Purpose of early feeding

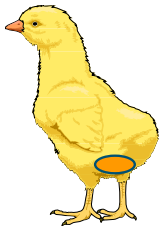
Without feed and water

✓Chicken still develops slightly posthatch

BUT:

- Impaired intestinal development
- Yolk proteins also used for energy
  - Not for immune competence
- Dehydrated easily

✓Duration of withdrawal important



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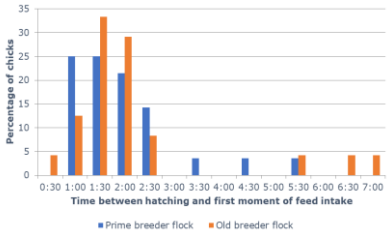
1. Purpose of early feeding

When do broiler chicks start to eat after hatch?



WAGENINGEN UNIVERSITY & RESEARCH Van Marwijk et al., unpublished

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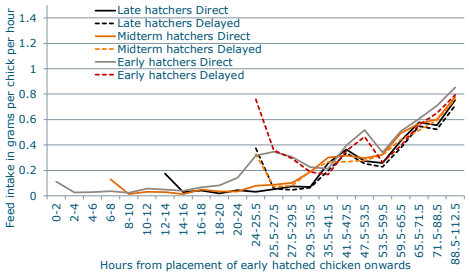
1. Purpose of early feeding

How much do broiler chicks eat after hatch?



WAGENINGEN UNIVERSITY & RESEARCH Lamot, unpublished

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1. Purpose of early feeding

- Improvement of posthatch performance
  - >36 hrs = Lower BW, Higher mortality
  - Larger effects in young breeder flocks
- Reduction antibiotic use ~ Field observations
  - Improvement of resilience ??
- Improvement of **animal welfare**
  - New legislation for broilers in Netherlands since 2019
    - Early feeding within 36 hours after hatch

WAGENINGEN UNIVERSITY & RESEARCH De Jong et al. 2018

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Roadmap of this presentation

1. Purpose of early feeding?
2. **Systems to apply early feeding**
3. Nutritional aspects of early feeding
4. First results of our Healthy Livestock project

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2. Systems to apply early feeding

Three type of systems available for early feeding:

a. Within traditional hatcher, holding room or during transport
b. Hatching system providing feed and water
c. On-farm hatching system

kindly provided by Vencomatic

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2. Systems to apply early feeding

a. Within traditional hatcher, holding room or during transport

SmartStart (PasReform)

HydroGel

WAGENINGEN UNIVERSITY & RESEARCH Source: PasReform/ClearH$_2$O

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2. Systems to apply early feeding

b. Hatching system providing feed and water – HatchCare

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2. Systems to apply early feeding

b. Hatching system providing feed and water – HatchCare

https://youtu.be/ZFah7lIO7Yw?t=95

From 1:35 until 2:00

WAGENINGEN UNIVERSITY & RESEARCH Source: HatchTech

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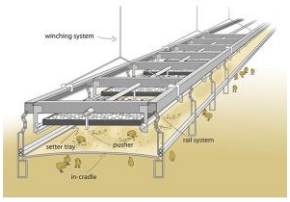
2. Systems to apply early feeding

c. On-farm hatching – X-Treck system



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2. Systems to apply early feeding

c. On-farm hatching – X-Treck system

https://youtu.be/IzQD1ICxxY8?t=10

From 0:10 until 0:28

WAGENINGEN UNIVERSITY & RESEARCH Source: Vencomatic

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2. Systems to apply early feeding

c. On-farm hatching – Patio system

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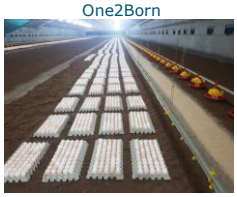
2. Systems to apply early feeding

c. On-farm hatching – No installation at farm needed

One2Born



NestBorn

WAGENINGEN UNIVERSITY & RESEARCH Source: One2Born, NestBorn

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2. Systems to apply early feeding

Considerations per hatching system

- Investments, ROI
- Labour availability
- Legislation, current & future
- Available knowledge
- Hygiene aspects

WAGENINGEN UNIVERSITY & RESEARCH Source: HatchTech

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Roadmap for this presentation

1. Purpose of early feeding
2. Systems to apply early feeding
3. **Nutritional aspects of early feeding**
4. First results of our Healthy Livestock project

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3. Nutritional aspects early feeding

Considerations of nutritional requirements posthatch

- Application **at hatchery**
  - Small amounts = Short period of time
- Application **at broiler farm**
  - Larger amounts = Longer period of time
- **Breeder age** differences

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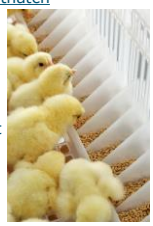
3. Nutritional aspects early feeding

Considerations of nutritional requirements posthatch

Embryonic period
- Largely dependent on fat oxidation

Posthatch period
- Lipids/ Oils not well digested = ??
  - Digestibility nutrients important
- Physical form of prestarter important
  - Pellet size and hardness



WAGENINGEN UNIVERSITY & RESEARCH Source: HatchTech

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3. Nutritional aspects early feeding

Study: Protein and energy level in prestarter
Ross 308 chickens, prime flock

4 dietary treatments
- High protein (12.5 g dig lys/kg), High energy (3,150 kcal)
- High protein (12.5 g dig lys/kg), Low energy (3,000 kcal)
- Low protein (10.8 g dig lys/kg), High energy (3,150 kcal)
- Low protein (10.8 g dig lys/kg), Low energy (3,000 kcal)

WAGENINGEN UNIVERSITY & RESEARCH Molenaar et al., 2018

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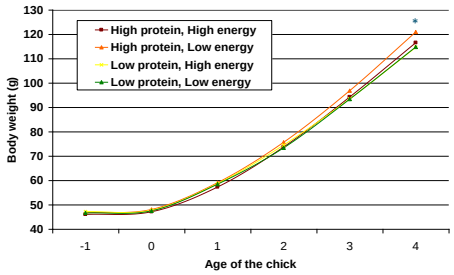
3. Nutritional aspects early feeding

Study: Protein and energy level in prestarter



*P<0.05; Molenaar et al., 2018

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3. Nutritional aspects early feeding

Study: Effect feed access and fat source in prestarter diet
Ross 308 males, prime flock

2 × 3 experimental design
- Early feeding: Yes or No (48 hrs)
- Prestarter diets: Control, Fish-oil, MCFA (Medium Chain Fatty Acids) until day 7 of age

Lamot et al., 2016

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3. Nutritional aspects early feeding

Study: Effect feed access and fat source in prestarter diet

Limited effect of diet on humoral immune function & long term BW gain

	DIR	DEL	CONT	FISH	MCFA	P-value
BW gain d2-7, gr	25.5[a]	18.9[b]	21.9[a]	21.8[a]	22.9[b]	<0.01

Lamot et al., 2016

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3. Nutritional aspects early feeding

Considerations about nutrient requirements posthatch

- Focus on growth only

or

- Include functional ingredients and nutrients
  - Optimizing (gut) health of chickens
    - Aiming for long-term effects

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Roadmap for this presentation

1. Purpose of early feeding
2. Systems to apply early feeding
3. Nutritional aspects of early feeding
4. **First results of our Healthy Livestock project**

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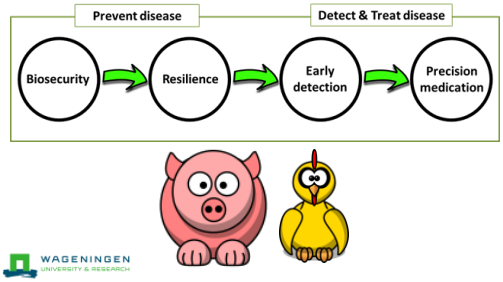
4. Healthy Livestock project

Multidisciplinary approach to reduce antimicrobial resistance (AMR)



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4. Healthy Livestock project

Intended studies:

Effect of hatching system on:

1. Broiler chicken health, welfare and performance

2. Resilience against vaccine challenge

3. Interaction with post-hatch enrichment

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4. Healthy Livestock project

Experimental design of study 1

- 3 treatments:
  - Hatchery-hatched (**Conventional**)
  - Hatchery fed (**HatchCare**)
  - On-farm hatching (**X-Treck**)
- Eggs of young breeder flock, Ross 308
- Experimental Poultry Centre, Belgium
  - 3 consecutive batches
  - 13,860 chickens/ batch
  - 4 pens/ treatment/ batch

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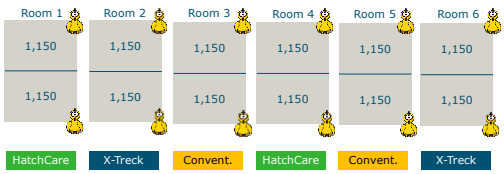
4. Healthy Livestock project

Lay-out farm and treatments



- ±20.5 chickens/ m^2

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4. Healthy Livestock project

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4. Healthy Livestock project

Performance results

Indicator	Hatchery-hatched (Conv)	Hatchery fed (HatchCare)	On-farm hatched (X-Treck)	SEM	P-value
First week mortality (%)	1.83	2.43	1.59	0.39	0.32
Total mortality (%)	3.27	4.39	3.20	0.47	0.17
FCR total period	1.46	1.46	1.48	0.009	0.28
Body weight @ d39 (g)*	2,634[b]	2,718[a]	2,750[a]	80	<0.001
		+84 g / 3.2%	+116 g / 4.4%		

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*50 animals per pen measured
Souza da Silva et al., 2021

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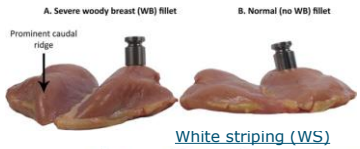
4. Healthy Livestock project

Wooden breast (WB)



White striping (WS)

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4. Healthy Livestock project

Wooden Breast (WB) and White Striping (WS)

	Hatching system		
	Hatchery-hatched (Conv)	Hatchery-fed(Hatch Care)	On-farm hatching (X-Treck)
% of Wooden Breast scores : P_{system}=0.04			
2 = very hard consistency	40.70	48.17	48.33
% of White Striping scores : P_{system}=0.002			
2 = severe, large white lines (1-2 mm)	48.87	57.69	66.86

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Souza da Silva et al., 2021

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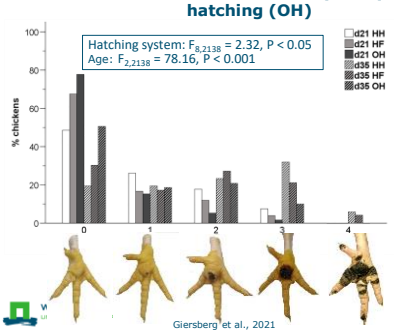
4. Healthy Livestock project

Food Pad Dermatitis = Less for **hatchery-fed (HF)** and **on-farm hatching (OH)**



Giersberg et al., 2021

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4. Healthy Livestock project

Chicks originating of young broiler breeder flock that were early fed by on-farm hatching or hatchery-fed showed:

- Higher body weight until d39
- Less food pad dermatitis
- No difference in FCR
- No difference in mortality
- More wooden breast (WB) and white striping (WS)

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Souza da Silva et al., 2021
Giersberg et al., 2021

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Summary

1. Purpose of early feeding
   Post-hatch performance and/or Animal welfare
2. Systems to apply early feeding
   Within hatchery or on-farm
3. Nutritional aspects of early feeding
   Dependent on hatching system and goal
4. First results of our Healthy Livestock project
   Long term effects in broilers of young flock
   Better performance, Less FPD,
   More breast myopathy

To feed or not to feed?
*That is **not** the question...*

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Thank you for your attention!

roos.molenaar@wur.nl
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