Birth weight and small piglets

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Virtual follow-up meeting | PattegriseLIV 2.0

9 June 2021

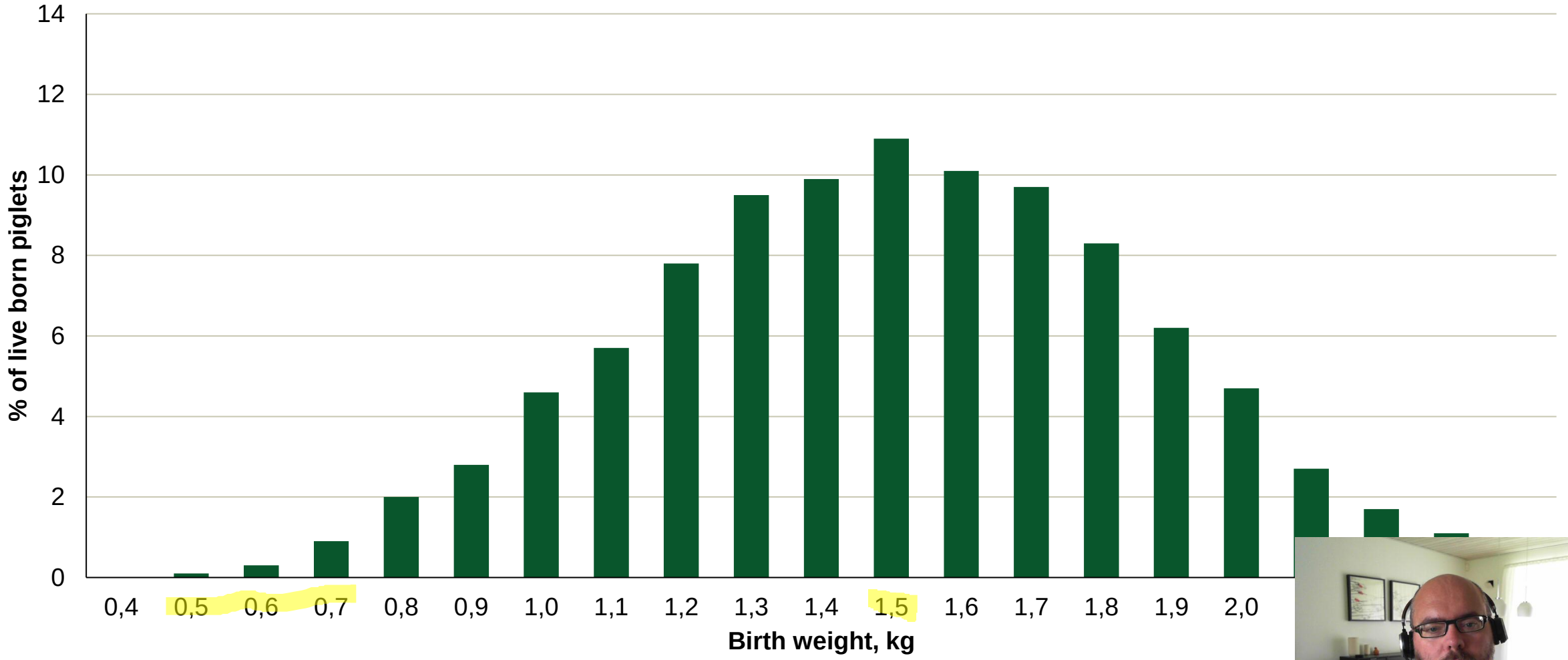
STØTTET AF
Svineafgiftsfonden
Miljø- og Fødevareministeriet
gudp

Birth weight and small pigs

- Status on birth weights in Denmark
- Feeding & follicular maturation before oestrus
- Feeding gestating sows & fetal development
- Focus on birth weight

Distribution of birth weight

12.334 piglets born in 2000-2001 (14,1 total born piglets per litter)



Source: Nielsen & Kring (2002)

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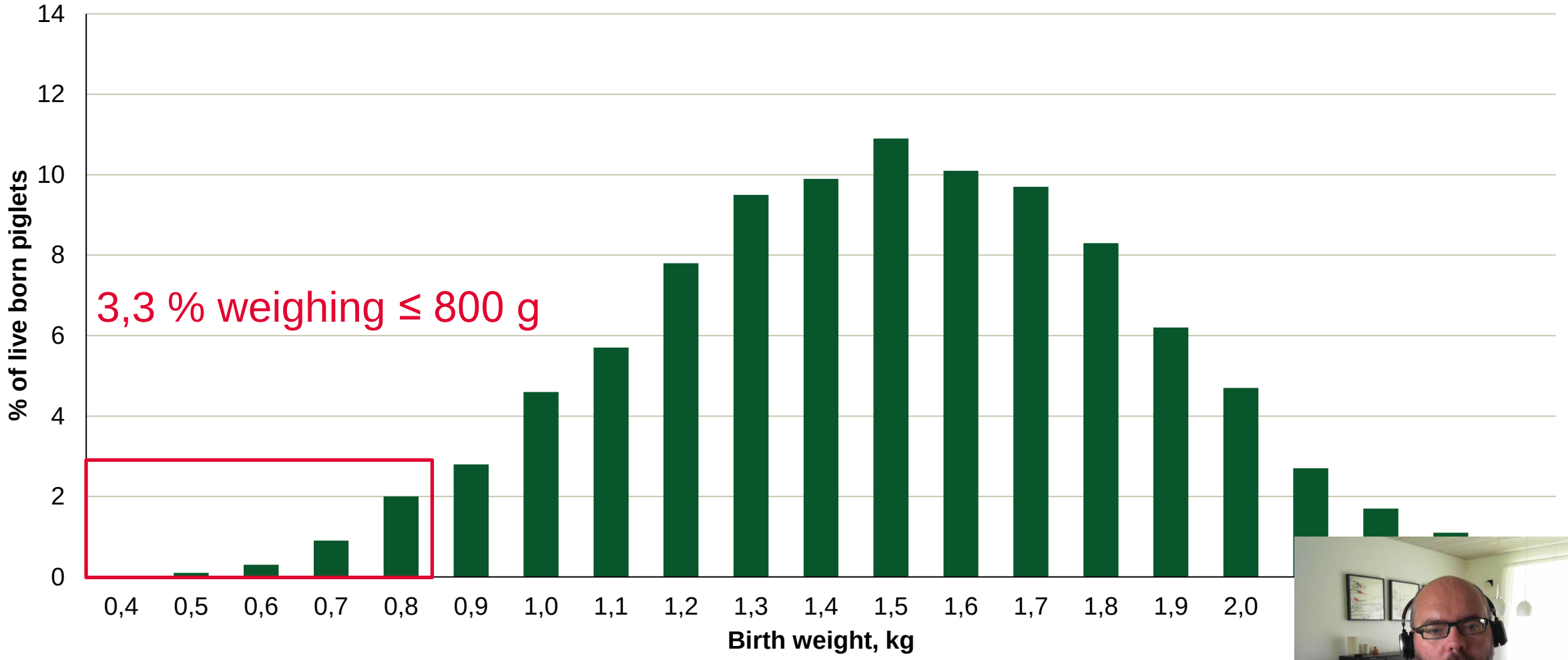
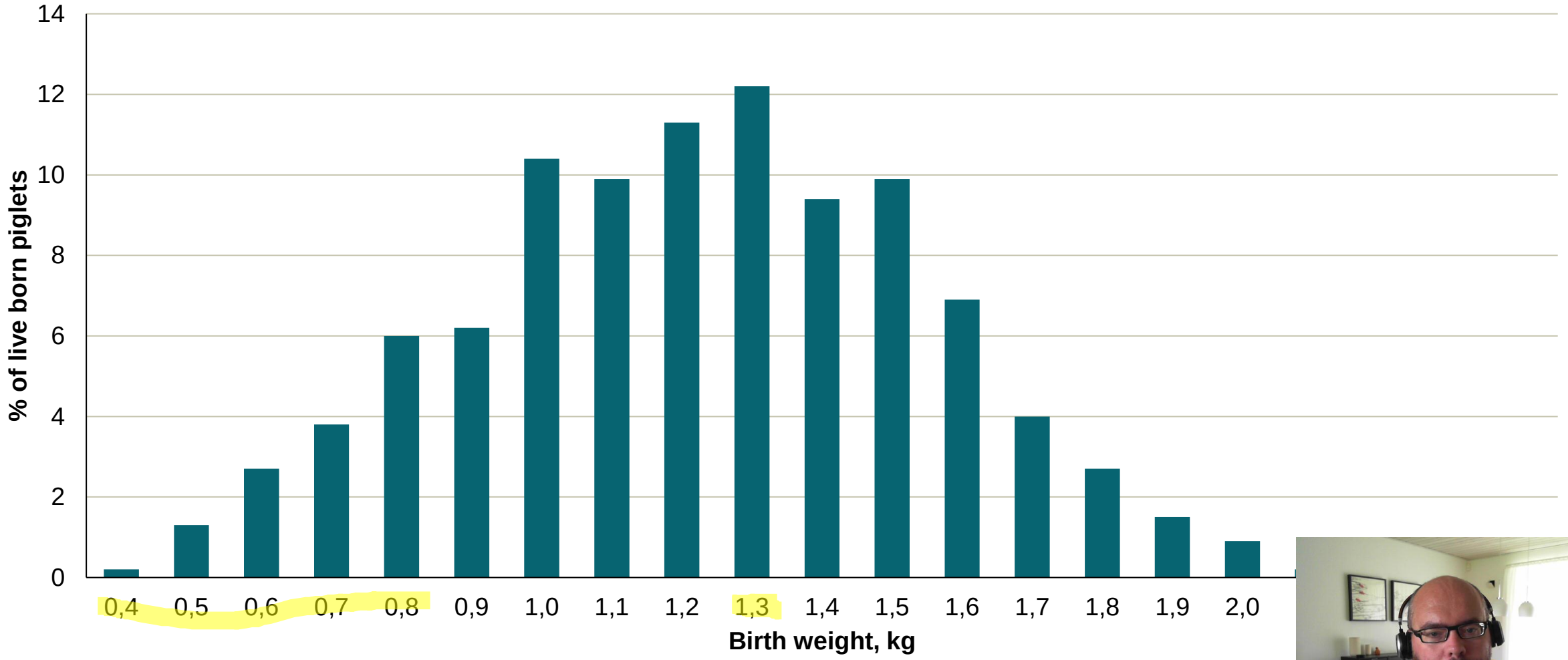


Source: Nielsen & Kring (2002)

Distribution of birth weight

8.000 piglets born in 2017 (21,2 total born piglets per litter)



Source: Thorup & Nielsen (2018)

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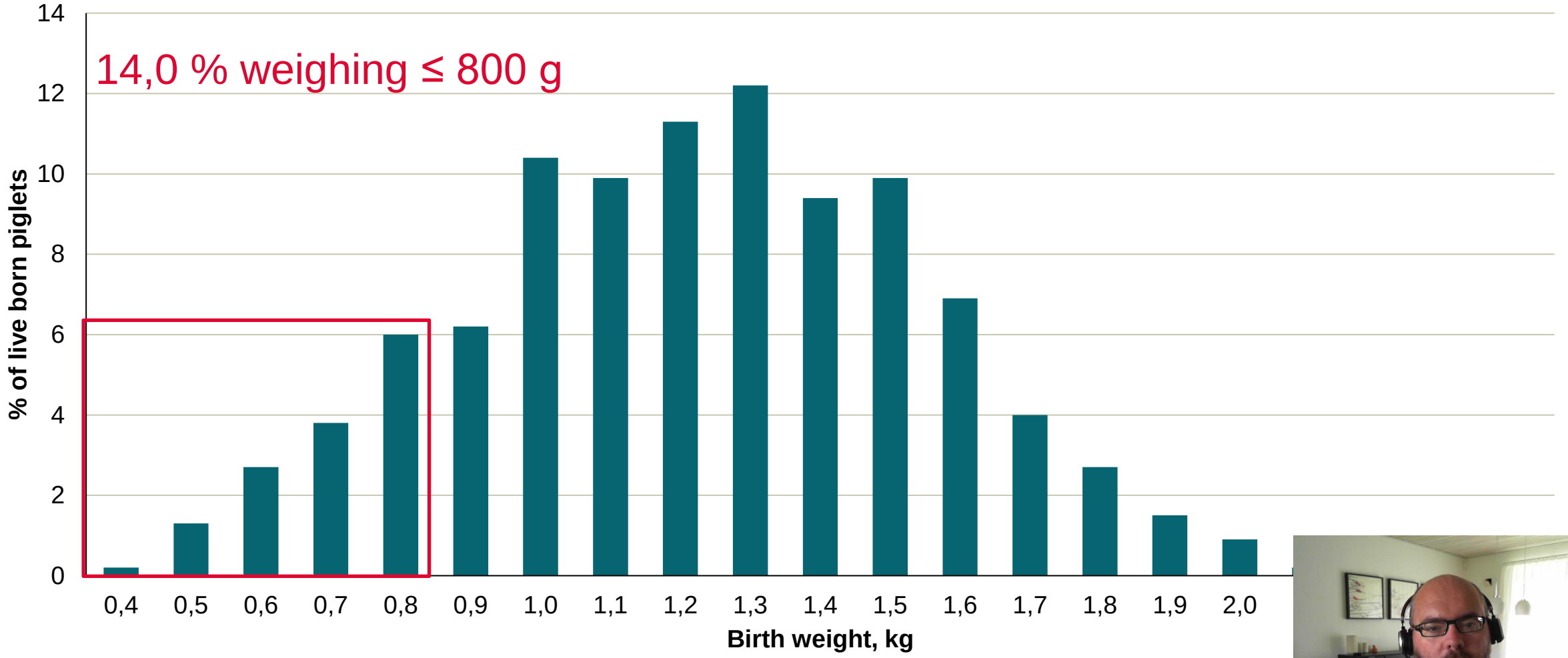
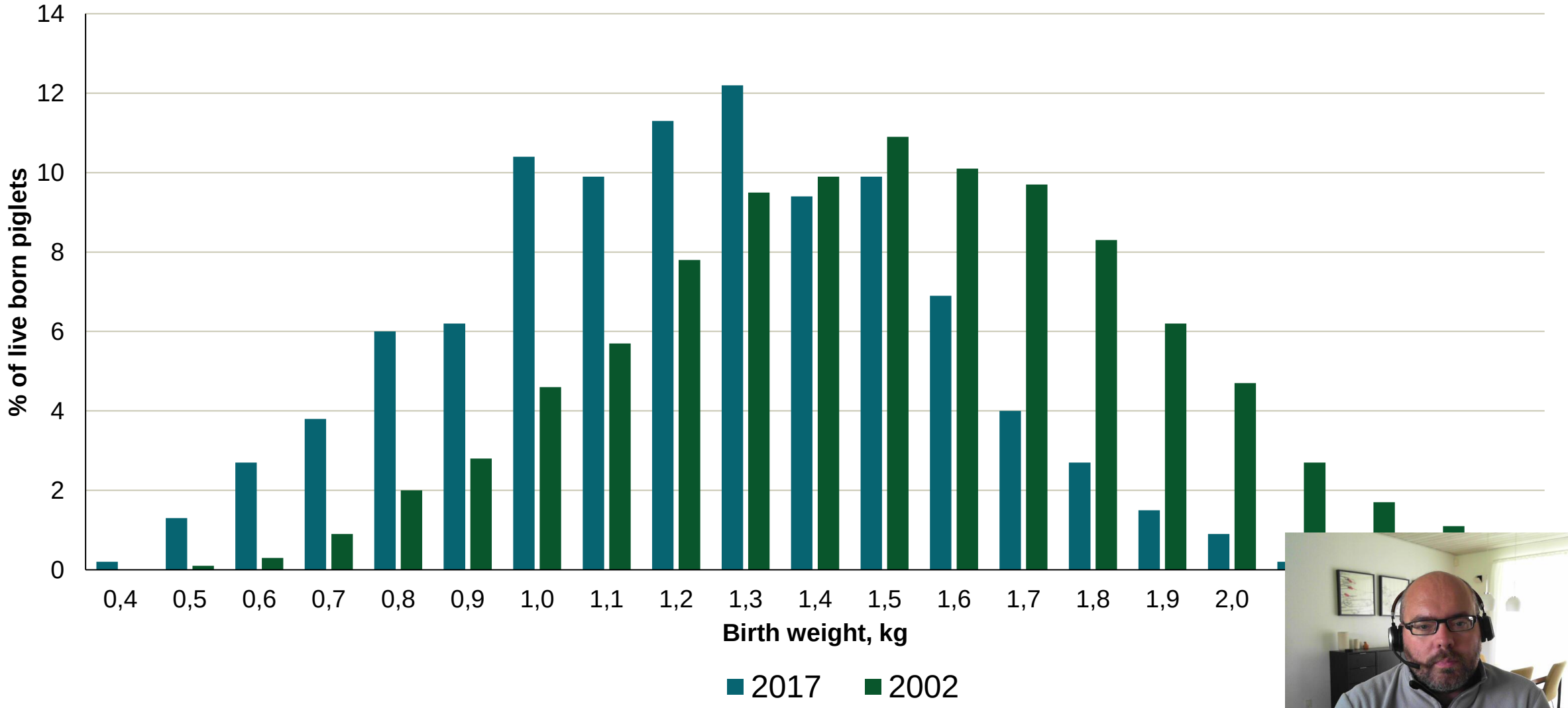


Source: Thorup & Nielsen (2018)

Distribution of birth weight
2000-2001 versus 2017



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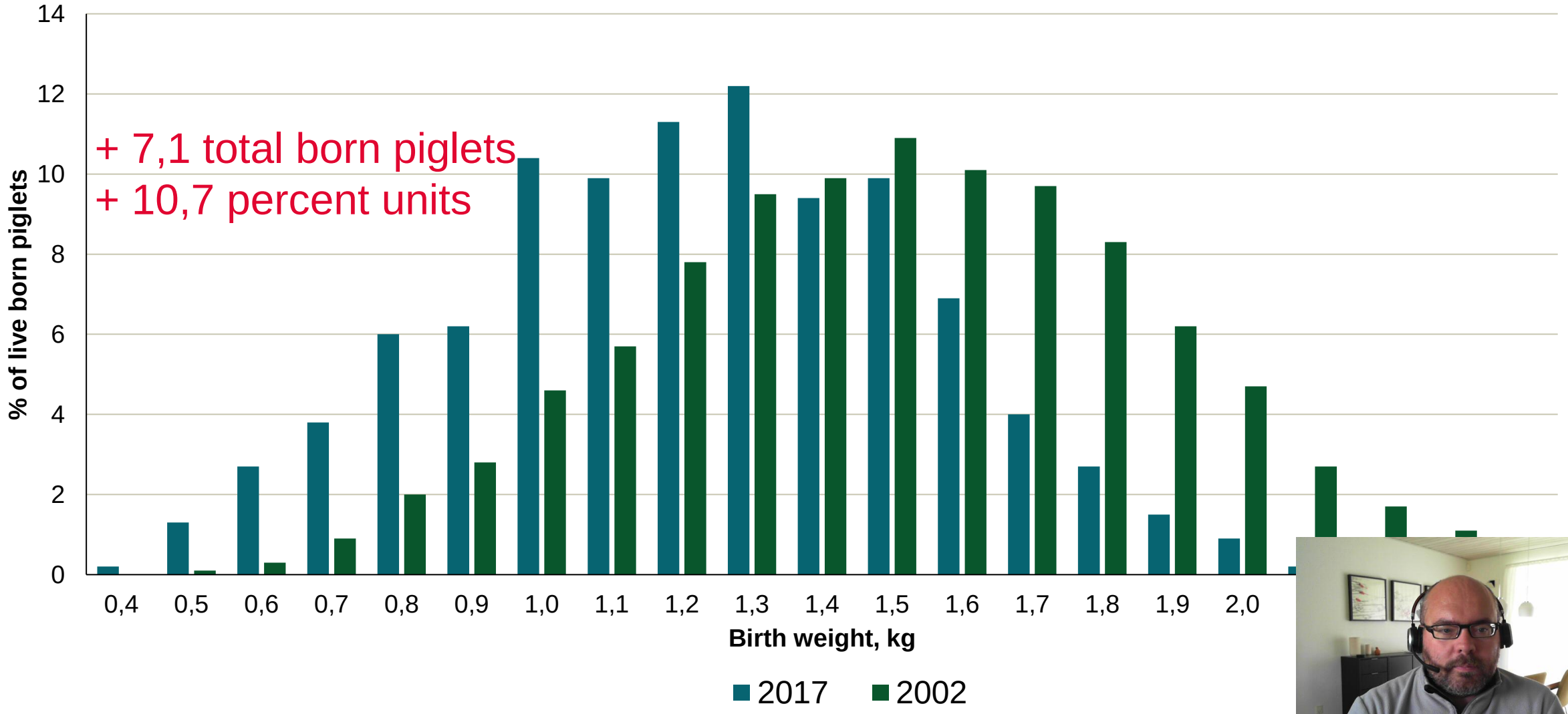
2000-2001 versus 2017



… if I want to increase birth weight …

- Increasing litter size leads to lower birth weight
  - Each additional total born piglet leads to a 30-40 g decrease in average birth weight per piglet
    (Beaulieu et al., 2010; Wientjes et al., 2012; Wientjes et al., 2013)
- LG5 (Live pigs at day 5) however results in more vital piglets at birth and furthermore increases survival despite lower birth weight

Birth weight and small pigs

- Status on birth weights in Denmark
- Feeding & follicular maturation before oestrus
- Feeding gestating sows & fetal development
- Focus on birth weight

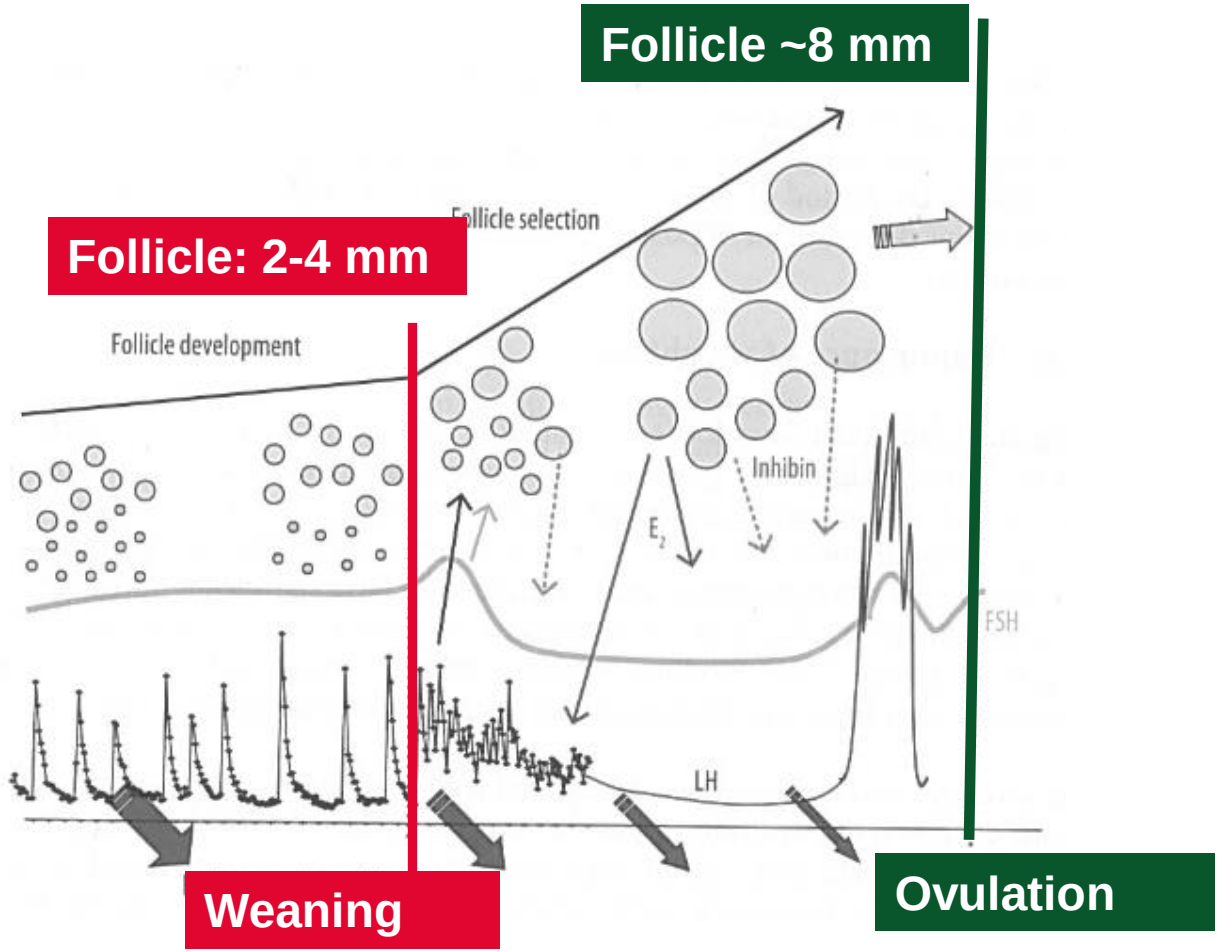
The challenge
Follicle development in sows has never been uniform

The ideal situation

The real situation

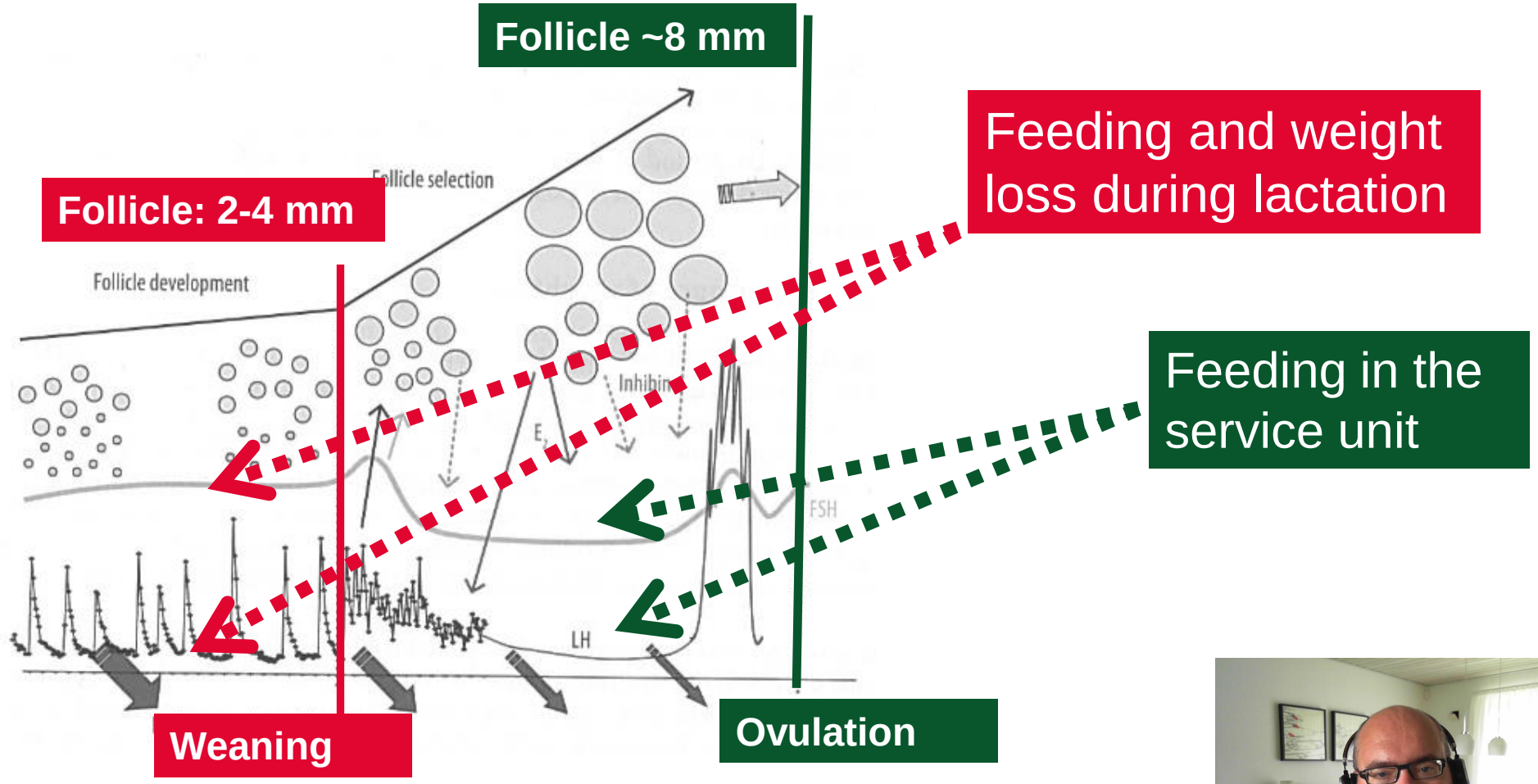
Illustration: Modified after Colourbox

Development of the follicle
During lactation and after weaning



Modified after Soede og Kemp (2015)

Development of the follicle
During lactation and after weaning



Modified after Soede og Kemp (2015)

Optimizing the feeding level
The hormone IGF-1 is a part of the succes

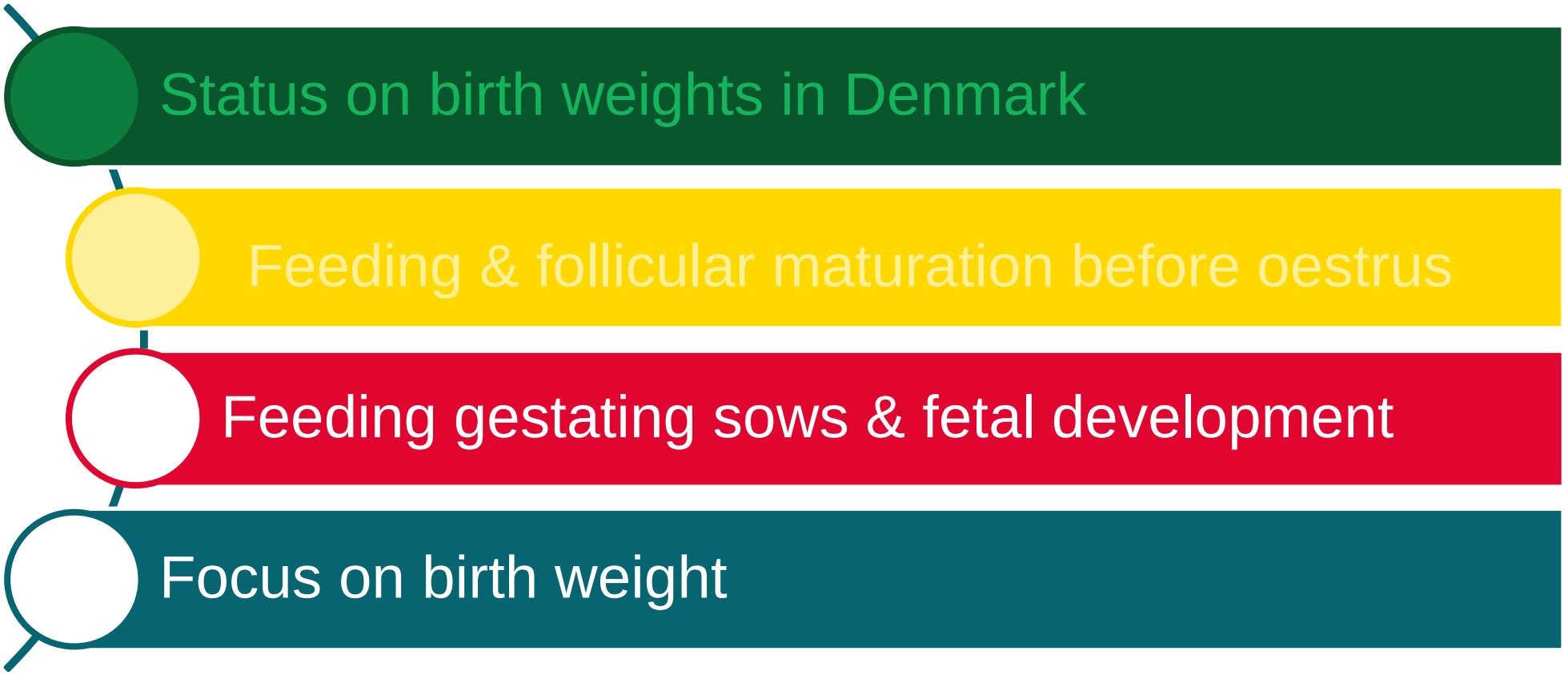
- IGF-1 provides an insight to sow energy status⇧/⇩
  - IGF-1 concentration decrease slightly if the sow mobilize backfat (Han et al. 2019)
  - The decrease is about 2.5 fold higher if the sow mobilize protein (Han et al. 2019)
  - Low IGF-1 concentration decreases follicle size at weaning and increases time from weaning to heat (Han et al. 2020)
  - IGF-1 is very important for follicle growth ⇨ FSH ⇧ + LH ⇧ (Soede et al. 2011)

Illustration: Colourbox

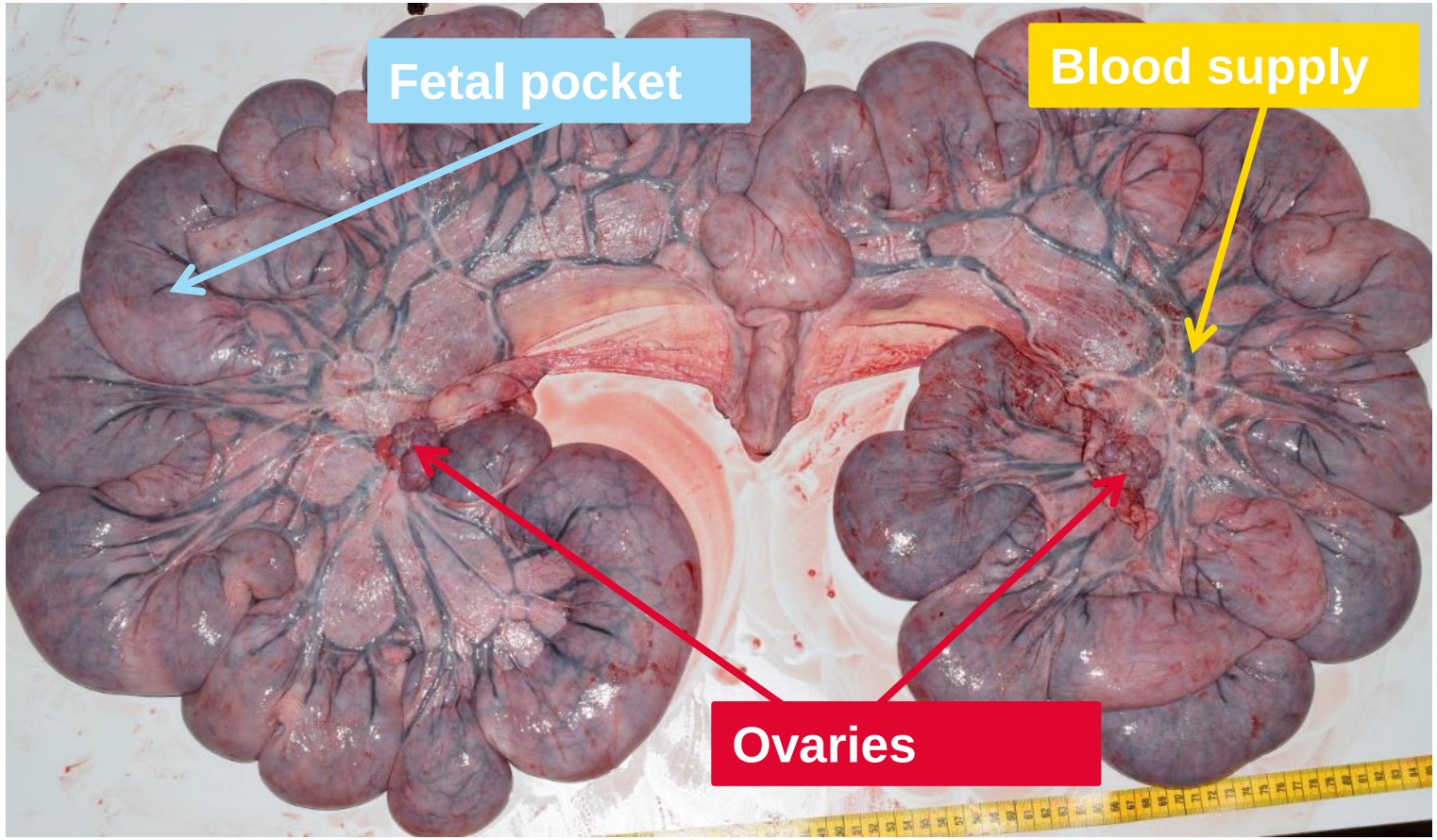
… if I want to increase birth weight …

- Avoid high weight loss in lactation
  - Acceptable weight loss 10-12 % (<20 kg) but rather 5-15 kg
  - Especially protein mobilization should be avoided (follow the Nutrient Standards)
  - High feed level all the way to weaning (8.75 FUsow per day)
- At weaning
  - No fasting (⇩ insulin + ⇩ IGF-1 ⇨ ⇩ FSH + ⇩ LH)
- From weaning to service
  - High feed level all the way (4.5-5.5 FUsow per day)
  - At least 92 % of the sows should come into heat 0-7 days after weaning

Birth weight and small pigs



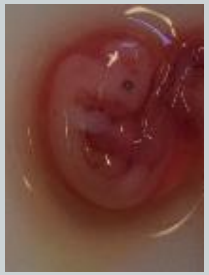
Fetal development
A look inside the sow (uterus)



Source: Strathe (2019)

Fetal development

Variation in fetal size and weight occurs in early gestation

Gestation day	28	33	45	50	56
					
Fetal weight, g	0.82	2.76	18.8	36.3	89.5
Variation coeficient, %	21	16	14	12	13

Example on variation in fetal size day 56

Kilde: Strathe (2019)

Recommended feeding curves

Must support growth of placenta, fetus as well as maternal growth

Days	Fat	Normal	Thin	Gilts
0	2,5	3,0	4,5	2,2-2,4
26	2,5	3,0	4,5	2,2-2,4
31	**2,3**	**2,3**	**3,5**	2,5-2,7
76	**2,3**	**2,3**	**3,5**	2,5-2,7
84	3,5	3,5	**3,5**	3,3
112	3,5	3,5	**3,5**	3,3
114	3,5	3,5	**3,5**	3,3
115	**3,5**	**3,5**	**3,5**	**3,0-3,5**
Faring	**3,5**	**3,5**	**3,5**	**3,0-3,5**

All values are expressed as FUsow per day

Recommended feeding curves

Must support growth of placenta, fetus as well as maternal growth

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112	3,5	3,5		3
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115	**3,5**	**3,5**		**0-3,5**
Faring	**3,5**	**3,5**	**3,5**	**3,0-3,5**

Avoid feeding under maintenance to reduce variation on birth weight

All values are expressed as FUsow per day

Recommended feeding curves

Must support growth of placenta, fetus as well as maternal growth

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0	2,5	3,0	4,5	2,2-2,4
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Faring	**3,5**	**3,5**	**3,5**	**3,0-3,5**

No reason to increase sow weight gain more than necessary

All values are expressed as FUsow per day

Recommended feeding curves

Must support growth of placenta, fetus as well as maternal growth

Days	Fat	Normal	Thin	Gilts
0	2,5	3,0	4,5	2,2-2,4
26	2,5	3,0	4,5	2,2-2,4
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Faring	**3,5**	**3,5**	**3,5**	**3,0-3,5**

No reduction of the feeding level when the requirement for fetal and udder growth reaches maximum

All values are expressed as FUsow per day

Extra feed in late gestation
Not a tool to increase birth weight

- From 3.5 to 4.5 FUsow in 4 weeks: Birth weight 1.34 kg +10 g per piglet (Sørensen 2012)
- From 3.5 to 4.0 FUsow in 4 weeks: Birth weight 1,31 kg + 0 g per piglet (Sørensen & Krogsdahl 2018)
- From 1.9 kg to 2.7 kg the last 2-3 weeks: Birth weight 1,3 kg + 0 per piglet (Greiner at al. 2016)

… if I want to increase birth weight …

- Avoid low feed level (<2,3 FUsow) in mid gestation
  - Low insulin reduces important growth factors in the fetuses (Fowden, 1995)
  - A risk that the sow will mobilize backfat
  - Too low feeding level increases the need for extra feed in late gestation
- Do not use high lysine and protein for gestating sows
  - Muscle growth will be too high
  - + 1 g lysin per FUsow results in + 5 kg muscle mass per gestation period
  - High lysine/protein reduces the possibility to restore backfat effectively

Birth weight and small pigs

Updated status on birth weight in Danish sows

Source: Riddersholm & Bahnsen (2020)

Data was collected in 12 herds in 2019 by master students Kristina Vesterager Riddersholm and Ida Bahnsen, Universtity of Copenhagen

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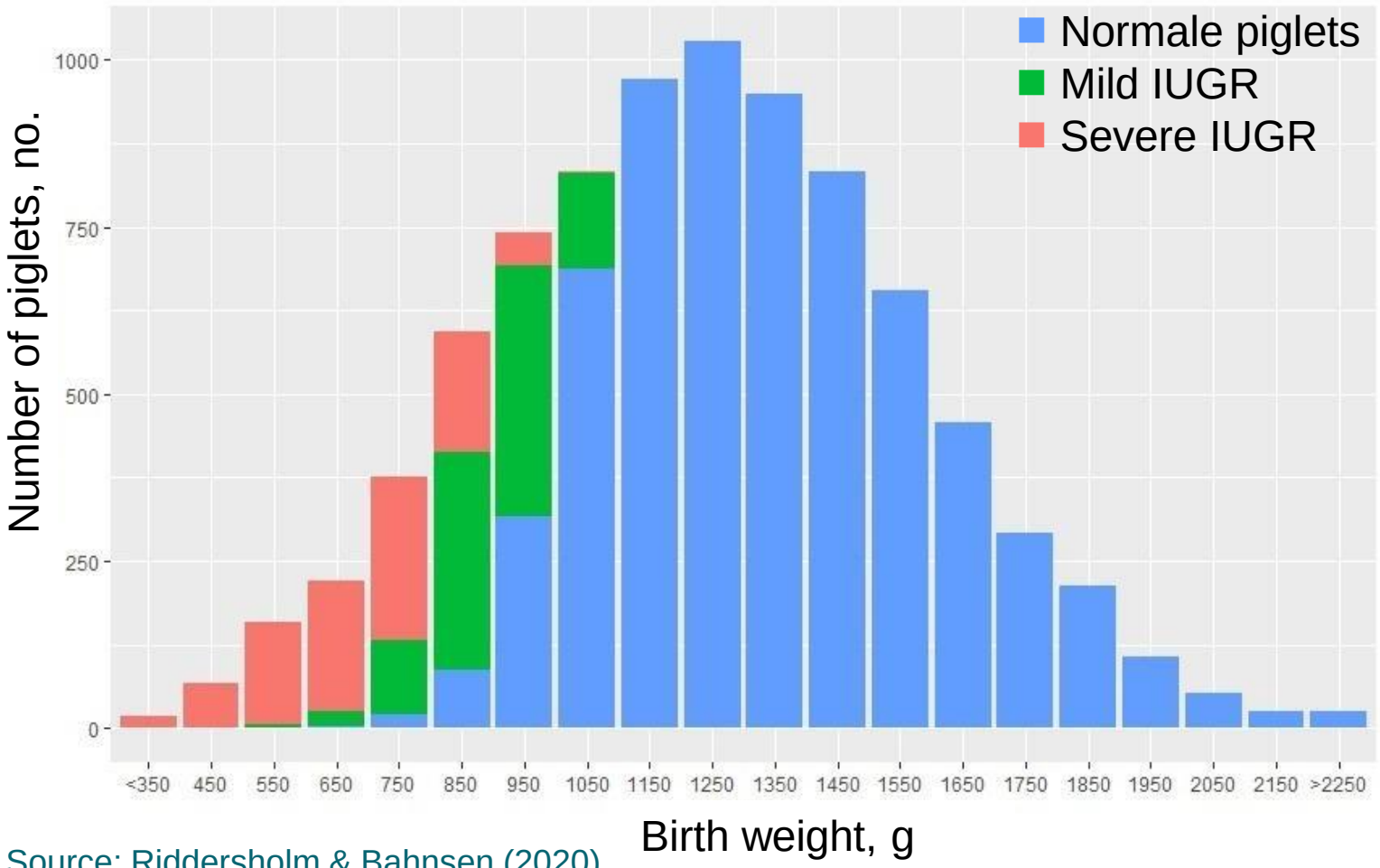

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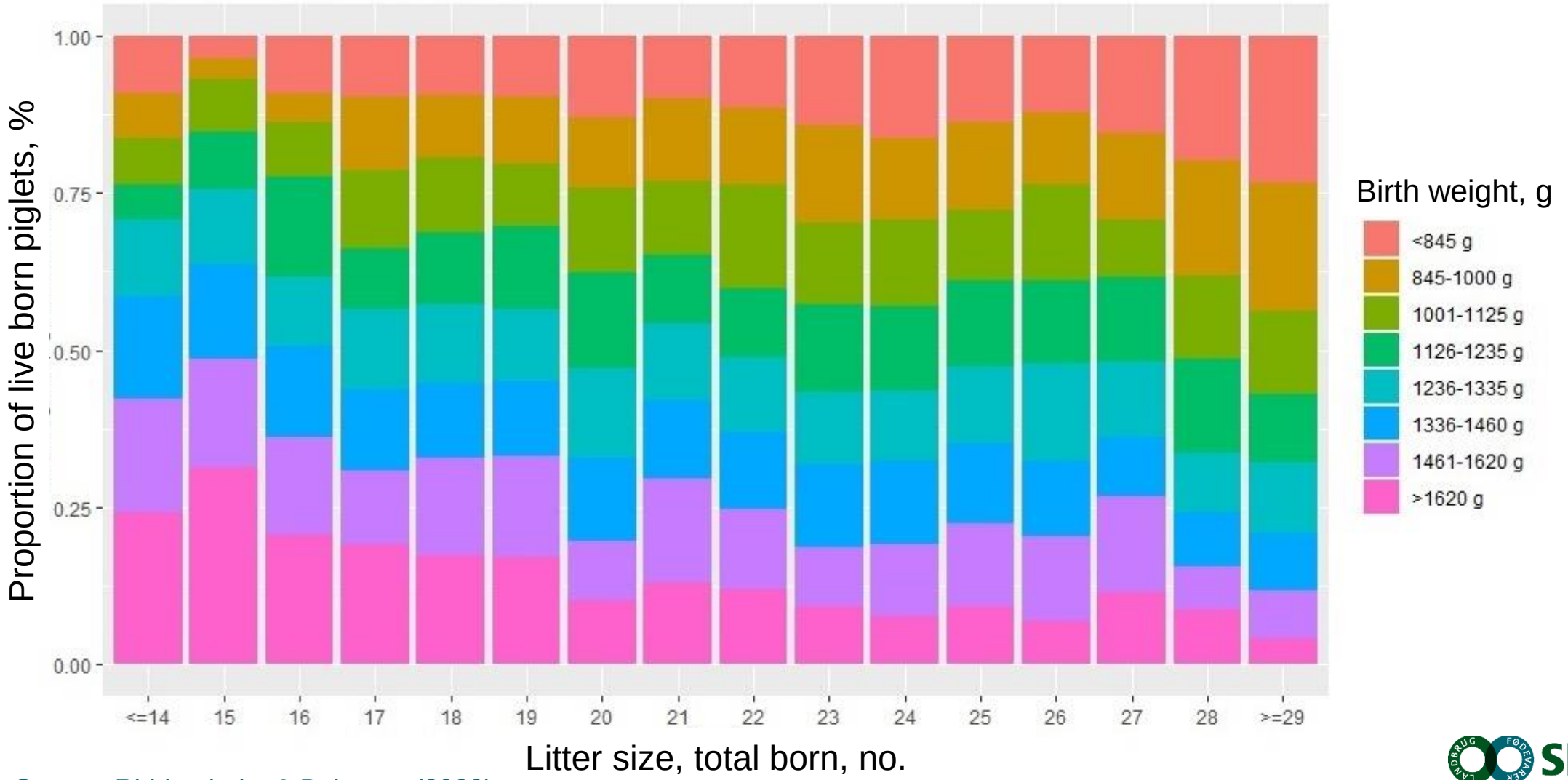
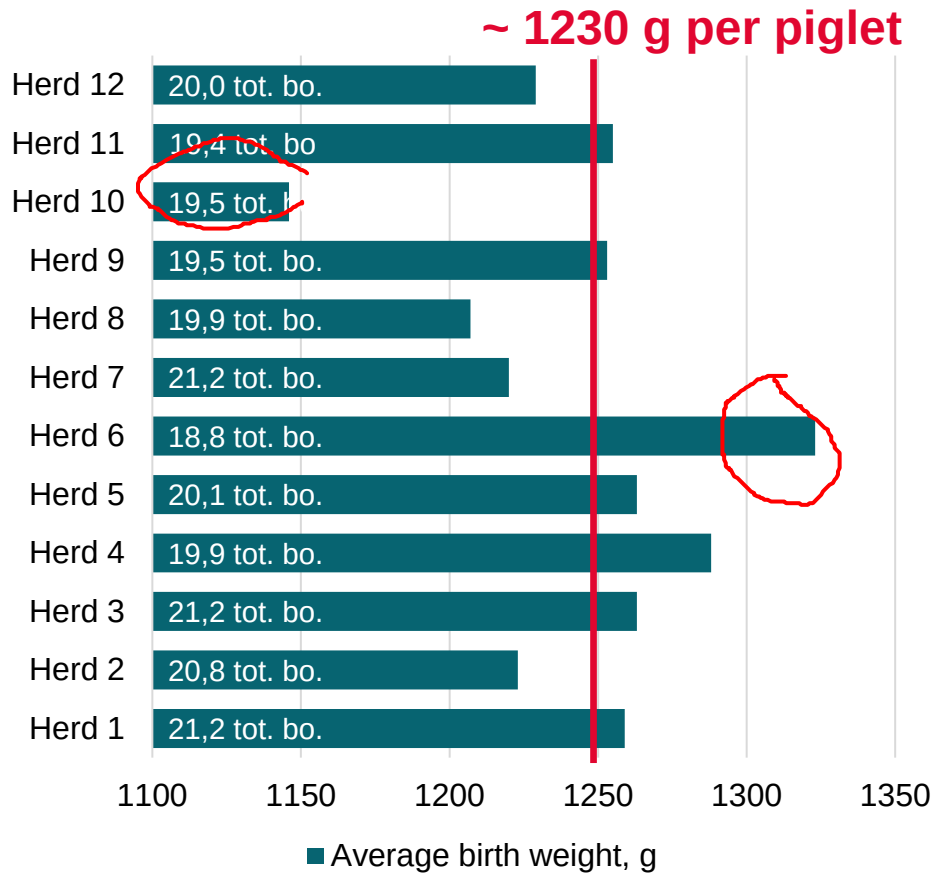
Link between litter size and birth weight



Source: Riddersholm & Bahnsen (2020)

Big differences between herds
Birth weight and occurrence of severe IUGR



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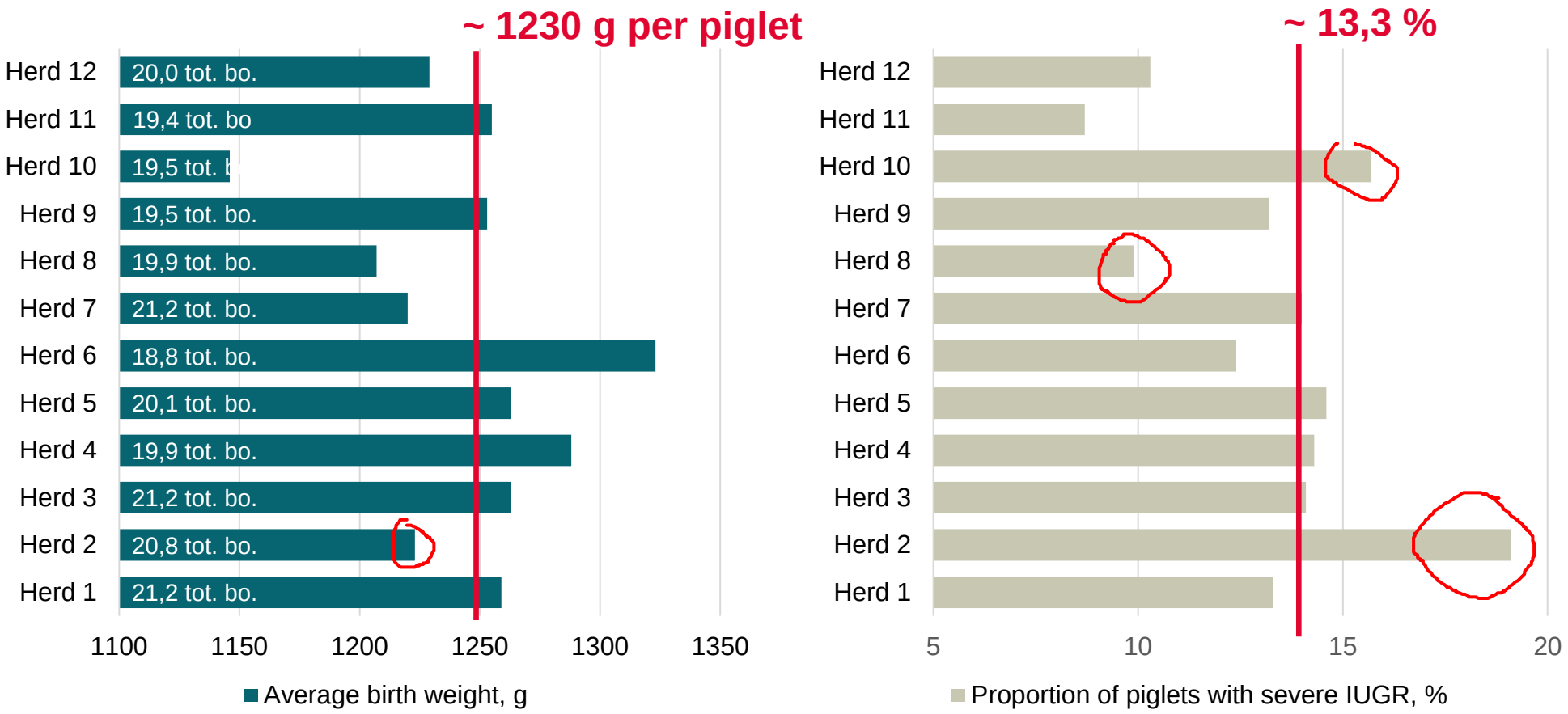

Source: Bahnsen & Riddersholm (2020)

… if I want to increase birth weight …

- Increasing litter size is challenging
  - 19,5-21,7 g decrease in birth weight for each additional piglet in the litter (Riddersholm & Bahnsen 2020)
  - Severe IUGR is increased by 0.68 % for each additional piglet in the litter (Riddersholm & Bahnsen 2020)

- If birth weight in your herd is low focus on:
  - Weight loss and backfat loss in lactation (5-15 kg weight loss is ok & ≥ 92 % in heat 0-7 days after weaning)
  - Feeding curves for gestating sows (including feeding precision)
  - Feed for gestating sows (avoid body building diets and check mixing precision)

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