Nurse Sows for Super Numerous Piglets

Thomas S. Bruun
SEGES Innovation, Aarhus, Denmark

IPVS-studienamiddag
Faculteit Diergeneeskunde, Ghent University
22 November 2024

SUPPORTED BY
Danish Pig Levy Fund

SEGES INNOVATION

Photo: Rasmus Bendix, Bendix Production

Received: 13 January 2023 | Accepted: 5 May 2023

DOI: 10.1002/mrd.23688

Molecular Reproduction & Development

REVIEW ARTICLE

Selecting the optimal strategies when using nurse sows for supernumerous piglets

Thomas Sønderby Bruun[1] | **Trine Friis Pedersen**[1] | **Flemming Thorup**[2] | **Anja Varmløse Strathe**[3]

[1]Livestock, SEGES Innovation, Aarhus, Denmark

[2]Livestock, SEGES Innovation, Copenhagen, Denmark

[3]Department of Veterinary and Animal Sciences, University of Copenhagen, Frederiksberg, Denmark

Correspondence
Thomas Sønderby Bruun
Email: thsb@seges.dk

Abstract

Hyper-prolific sows frequently do not have a sufficient number of functional teats for their piglets to nurse which has led to the use of nurse sows to manage these surplus piglets. This review discusses strategies for using nurse sows and factors that influence preweaning survival and weight gain of their litters, as well as those that affect their subsequent rebreeding performance. Rearing piglets using a nurse sow can be as successful as piglets reared with their biological mother and is thus a powerful management tool to decrease preweaning piglet mortality. Selecting a young sow as nurse sow is beneficial for piglet survival; however, piglets nursing first

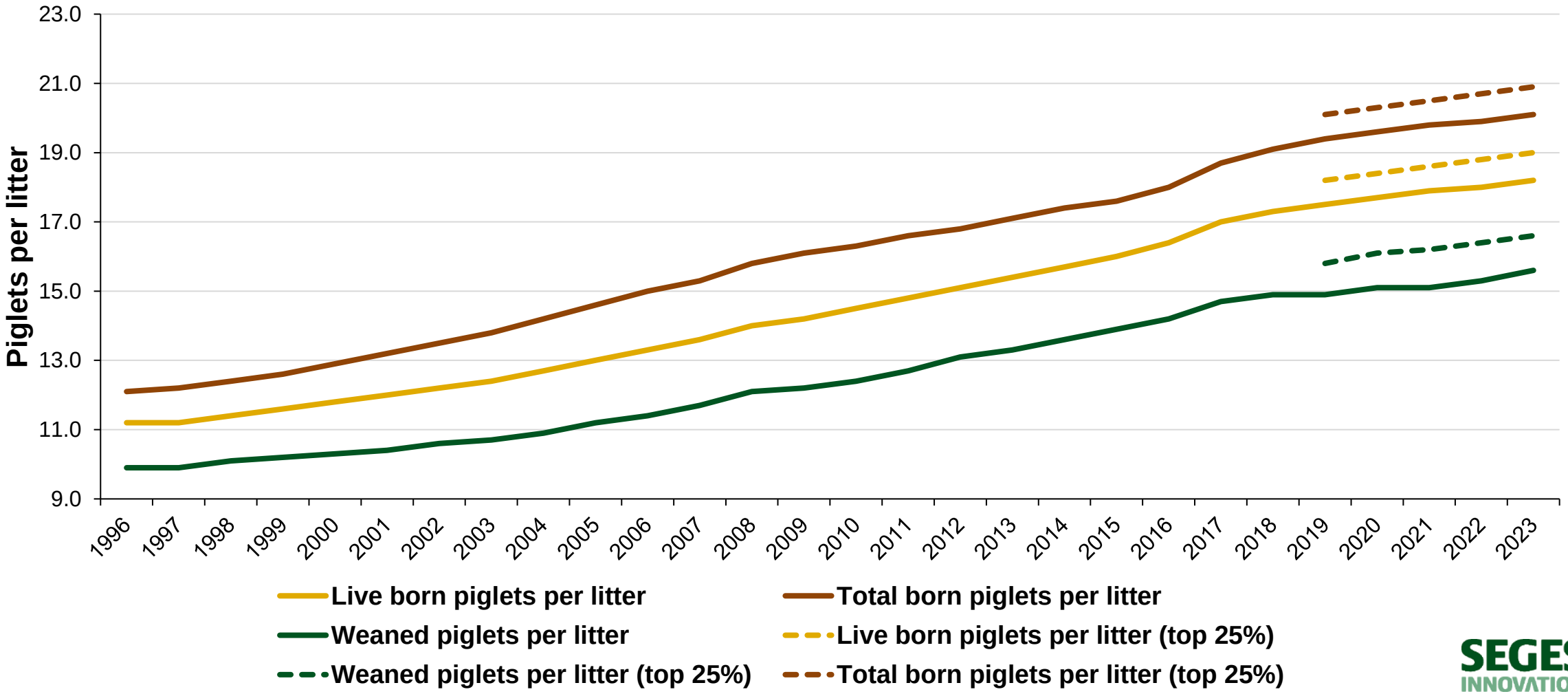
SEGES INNOVATION

Background

Photo: Rasmus Bendix, Bendix Production

Development in litter size

National Danish average results (mainly DanBred) from 1996 to 2023

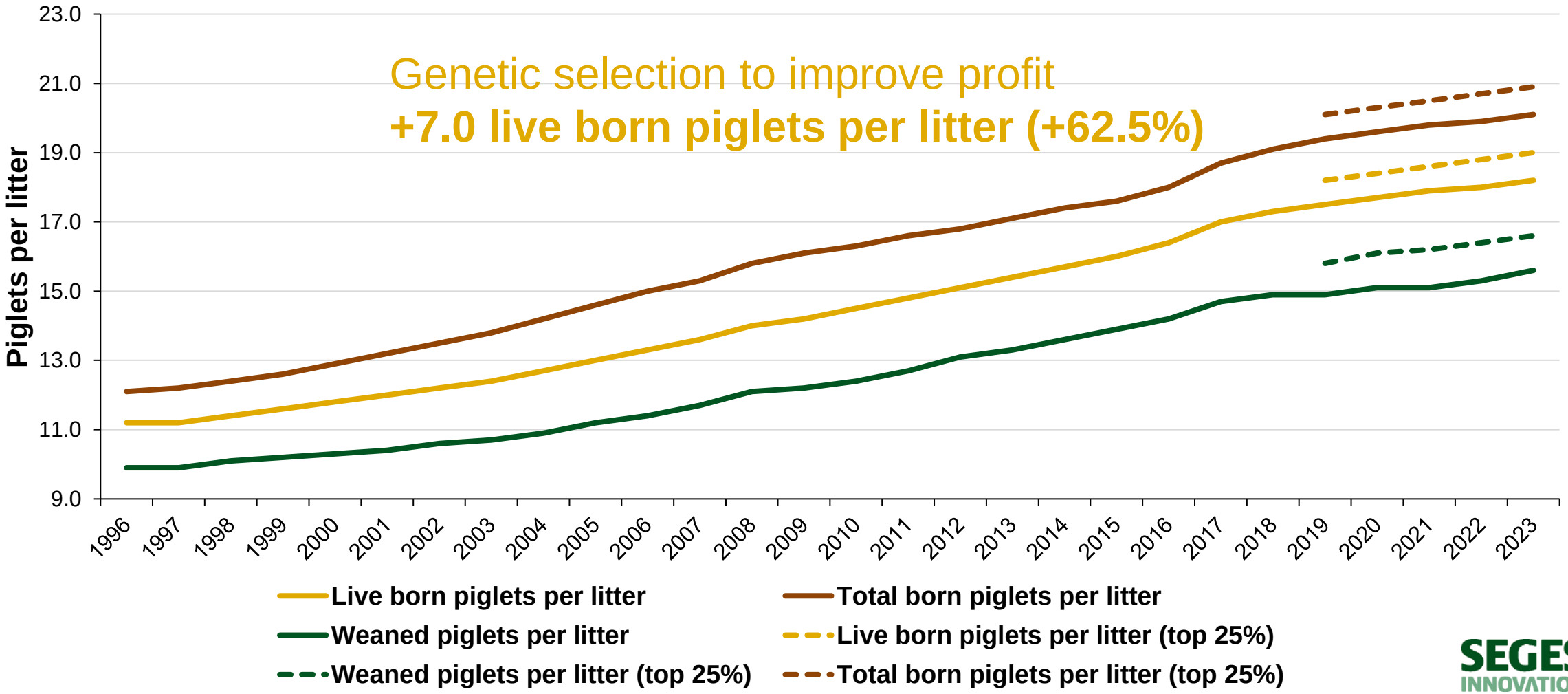


SEGES INNOVATION

References: National averages published anually at www.svineproduktion.dk or www.landbrugsinfo.dk

Development in litter size

National Danish average results (mainly DanBred) from 1996 to 2023

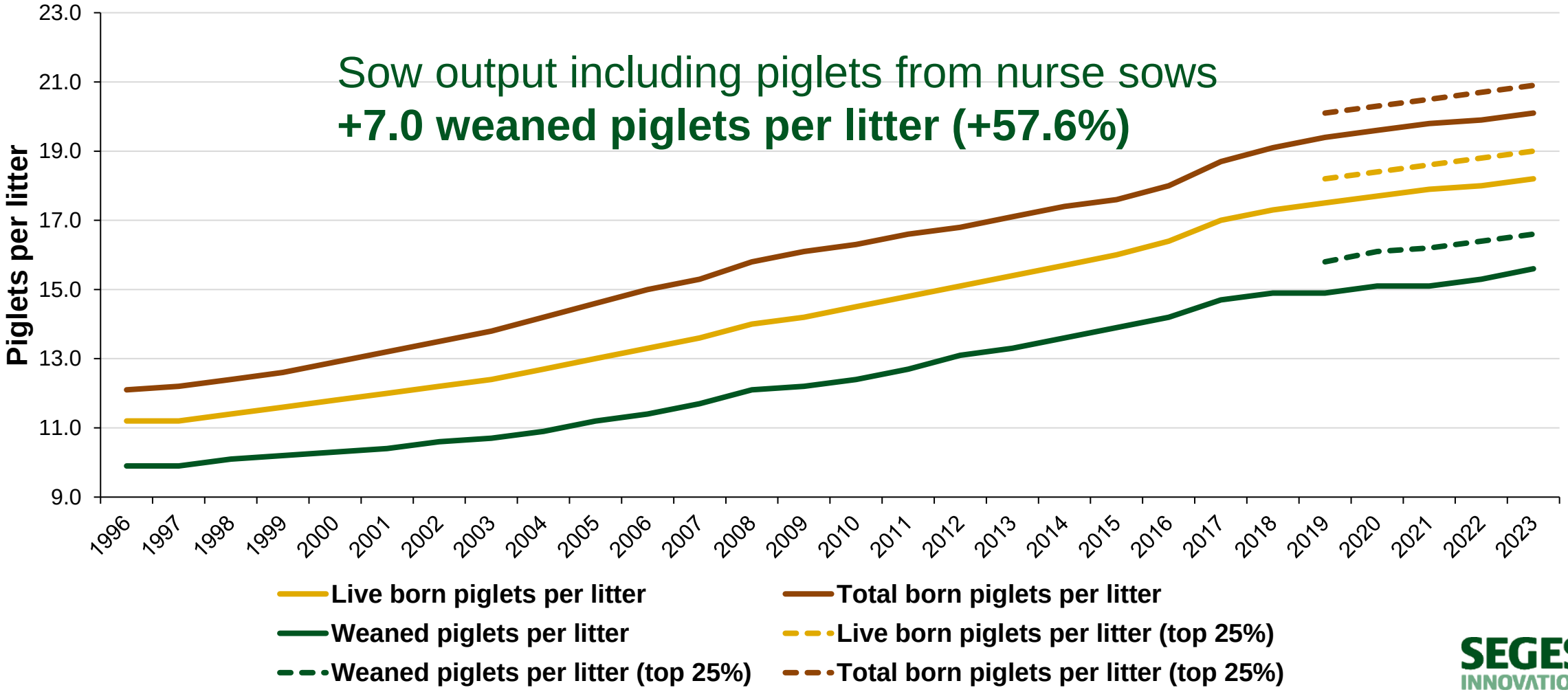


SEGES INNOVATION

References: National averages published anually at www.svineproduktion.dk or www.landbrugsinfo.dk

Development in litter size

National Danish average results (mainly DanBred) from 1996 to 2023

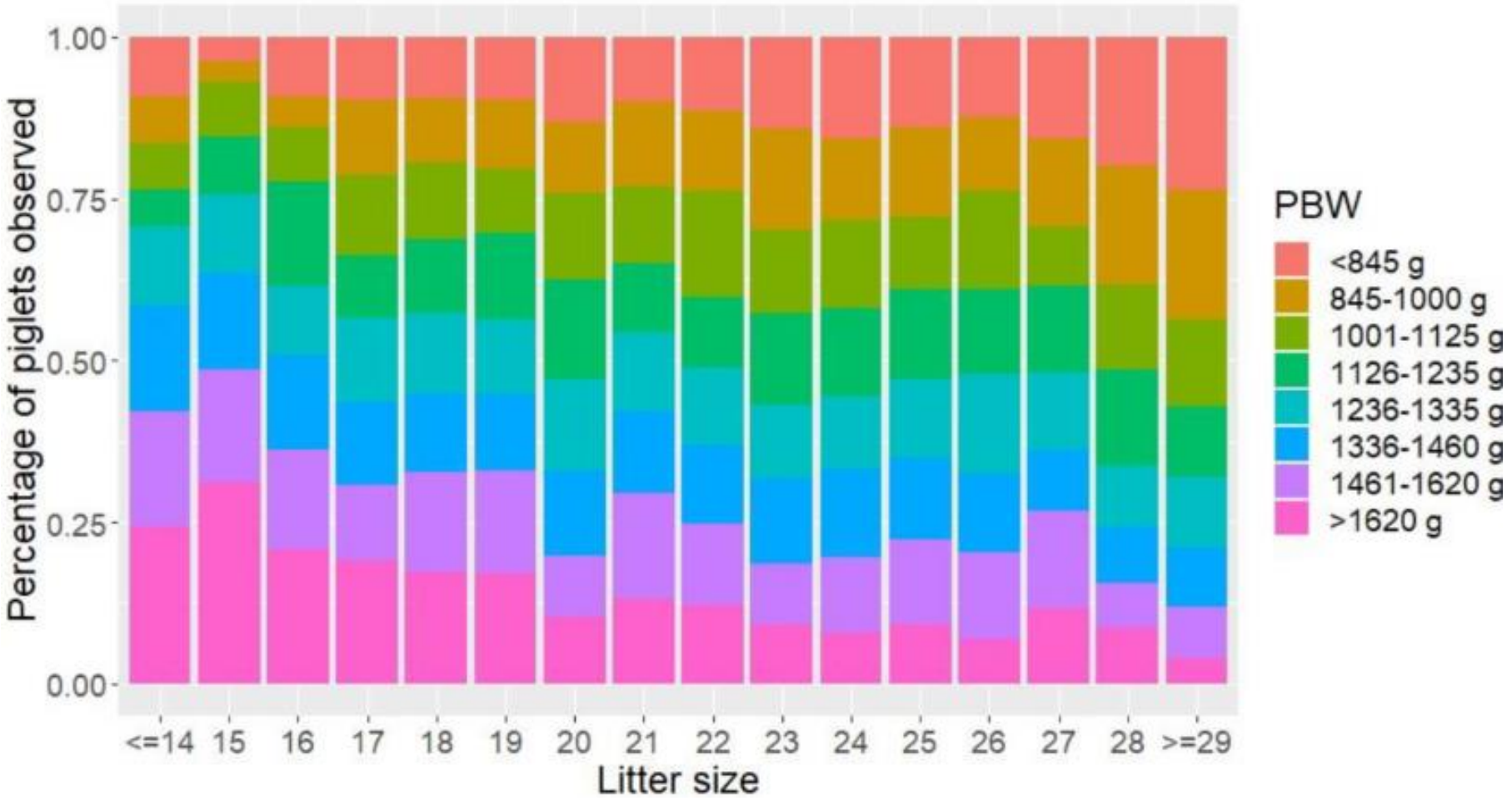


SEGES INNOVATION

References: National averages published anually at www.svineproduktion.dk or www.landbrugsinfo.dk

Consequenses of increasing litter size

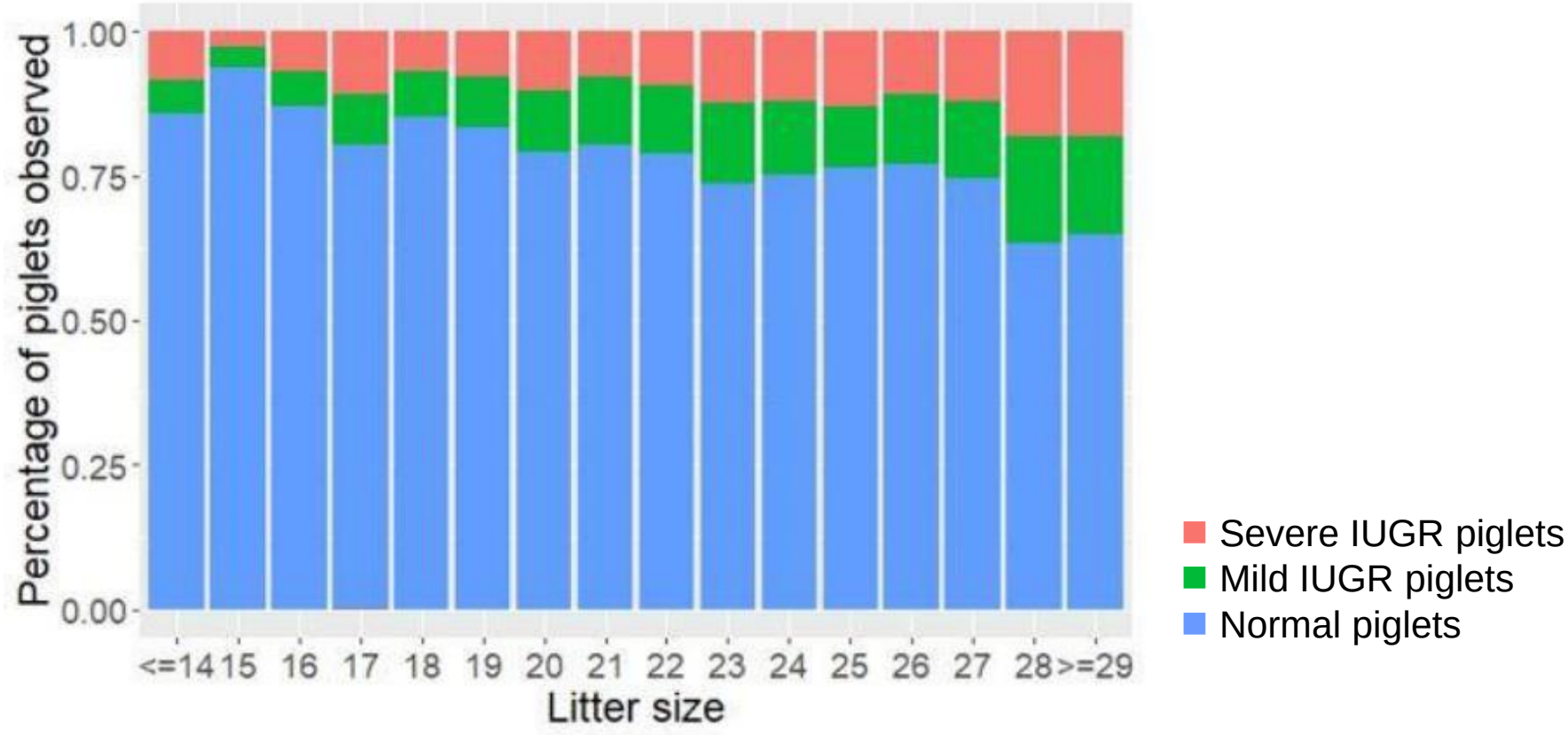
Decreasing birth weight



SEGES INNOVATION

Reference: Riddersholm et al. (2021): *Animals*. 11: 2731

Consequenses of increasing litter size
Increased prevalence of IUGR piglets

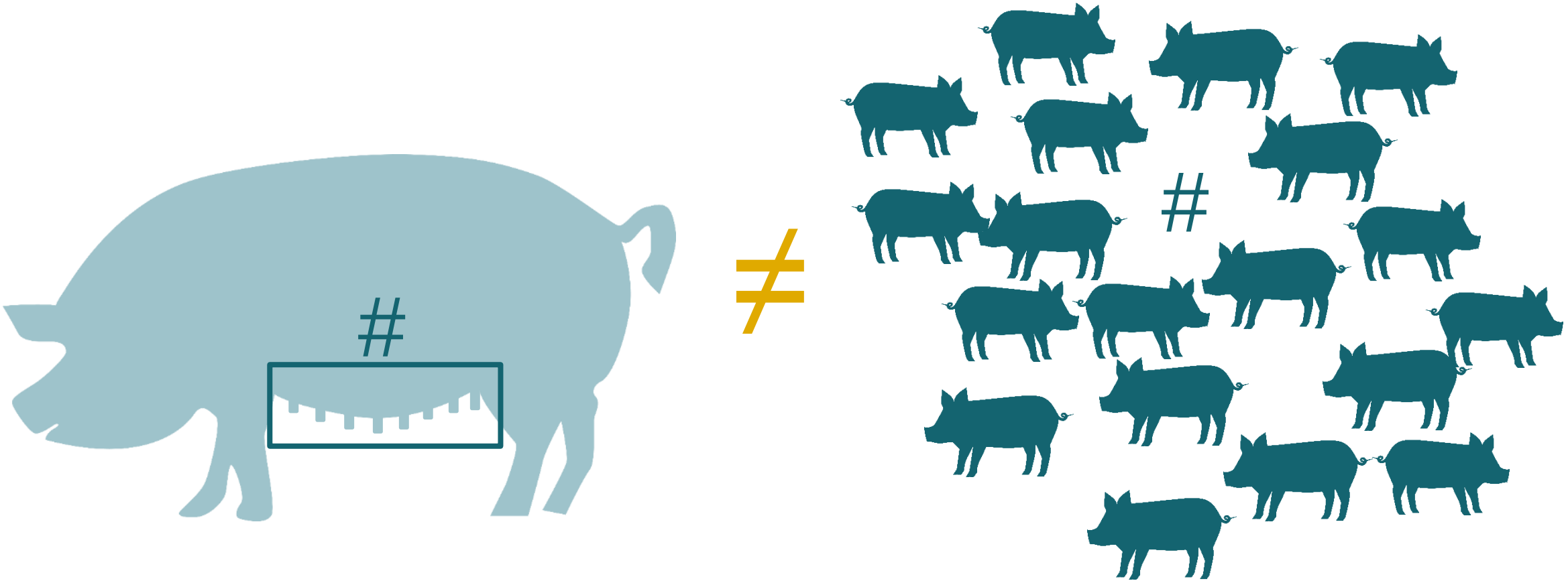


SEGES INNOVATION

Reference: Riddersholm et al. (2021): *Animals*. 11: 2731

Additional consequences of increasing litter size

Supernumerous piglets within many litters



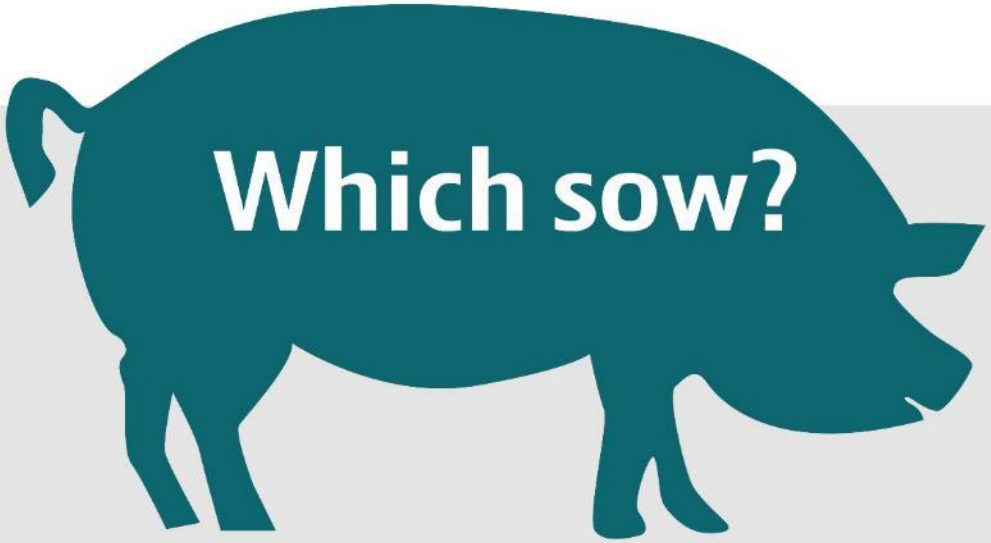
Definition of the hyper-prolific sow?!

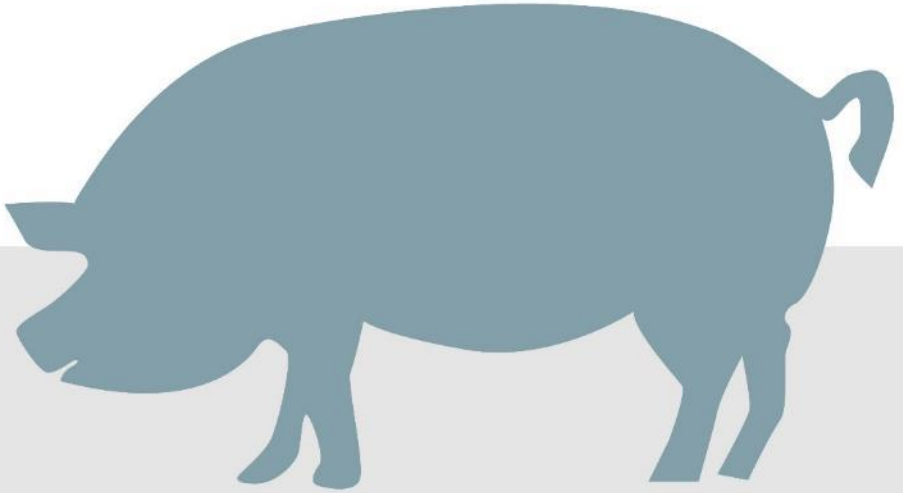
SEGES INNOVATION

Aim of this presentation

Photo: Rasmus Bendix, Bendix Production

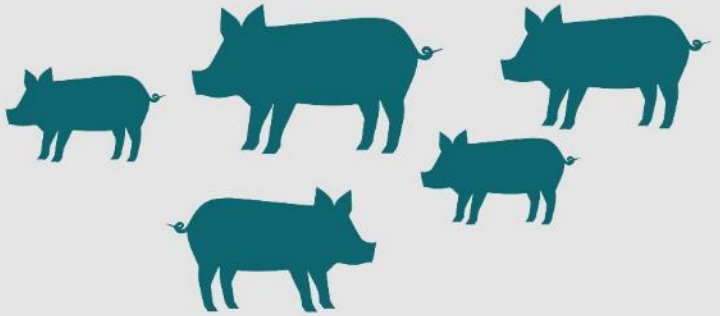
Nurse sows





Days of lactation

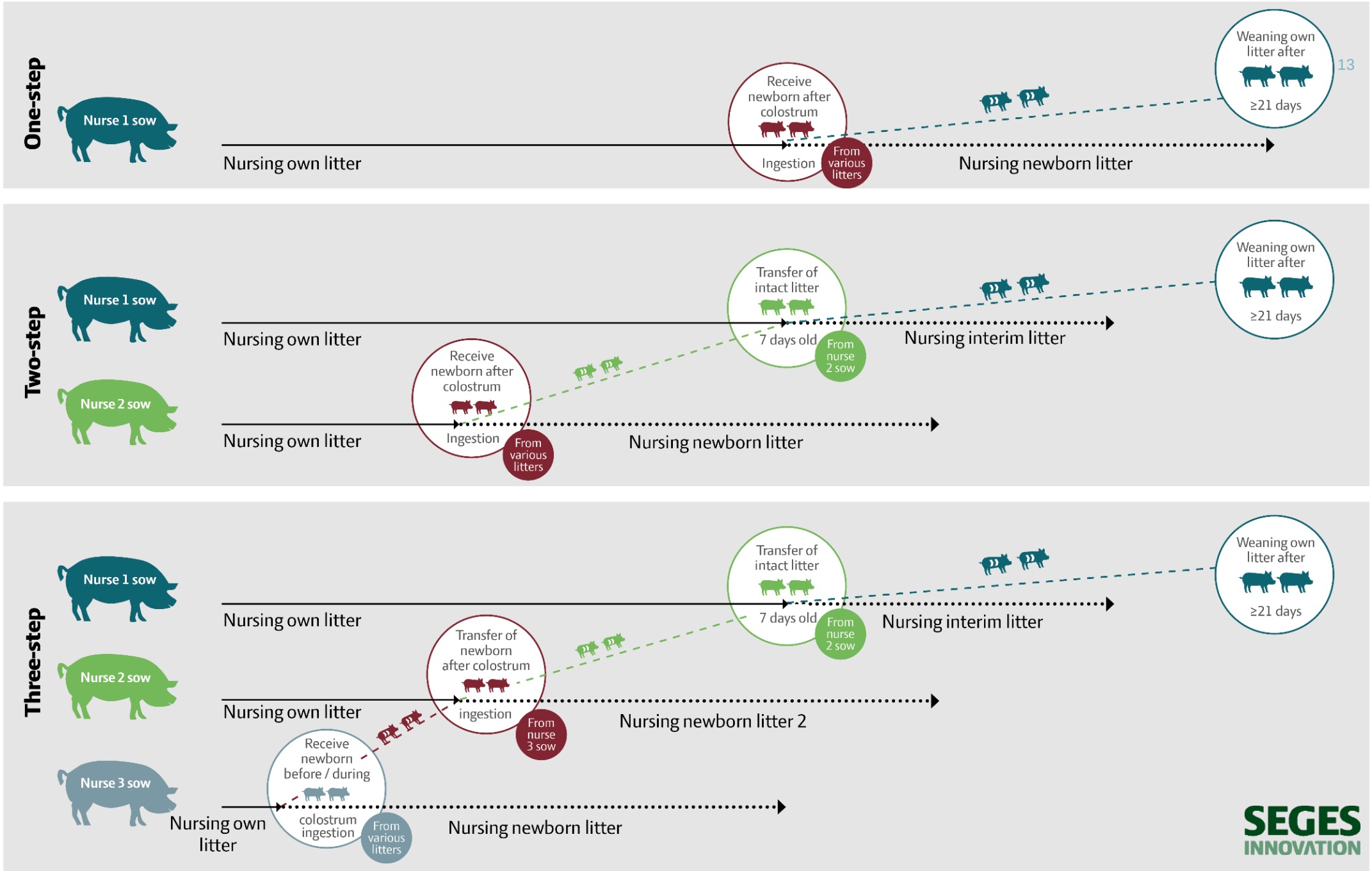
Which piglets?



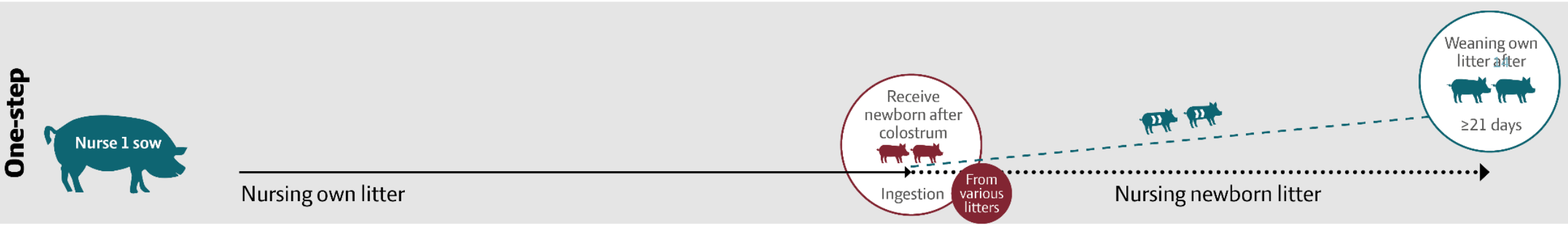
Nurse sow strategy

Photo: Rasmus Bendix, Bendix Production

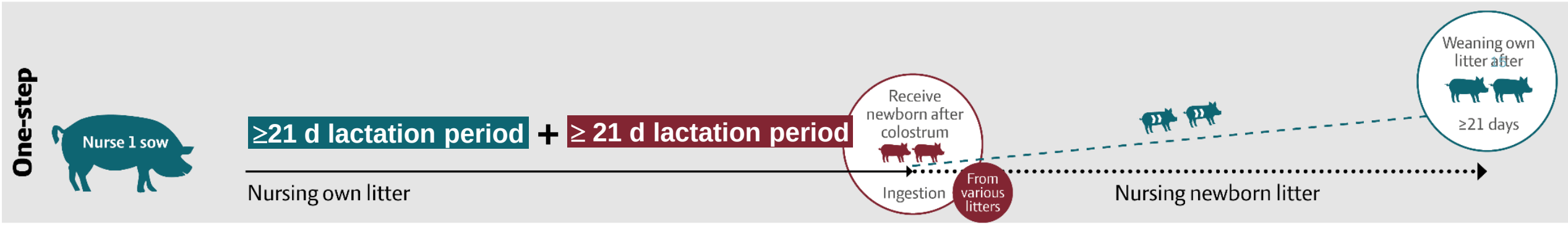
Nurse sow strategy



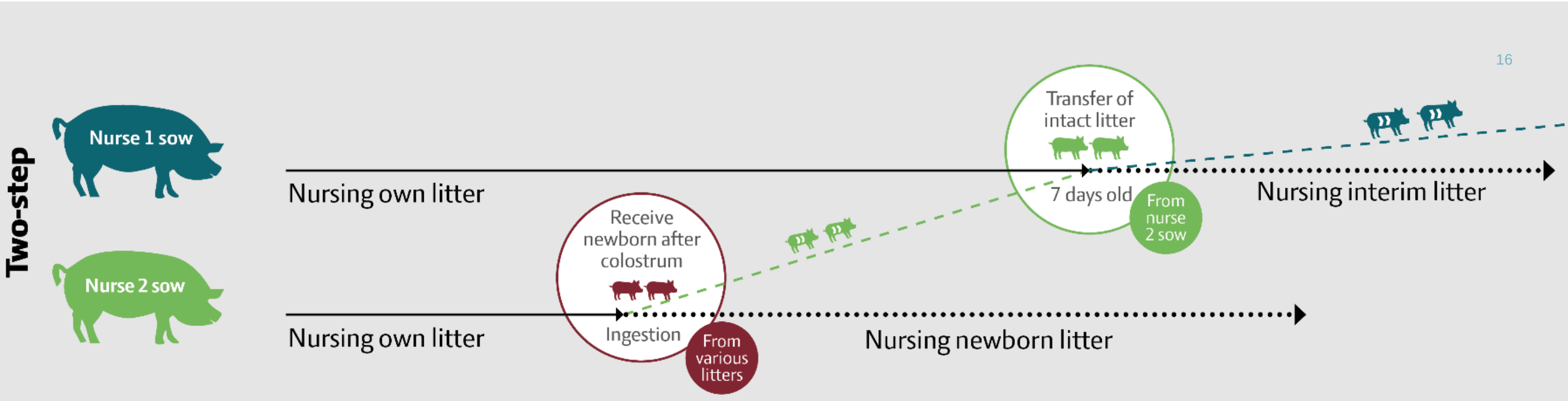
Reference: Bruun et al. (2023): *Molecular Reproduction and Development*. mrd.23688



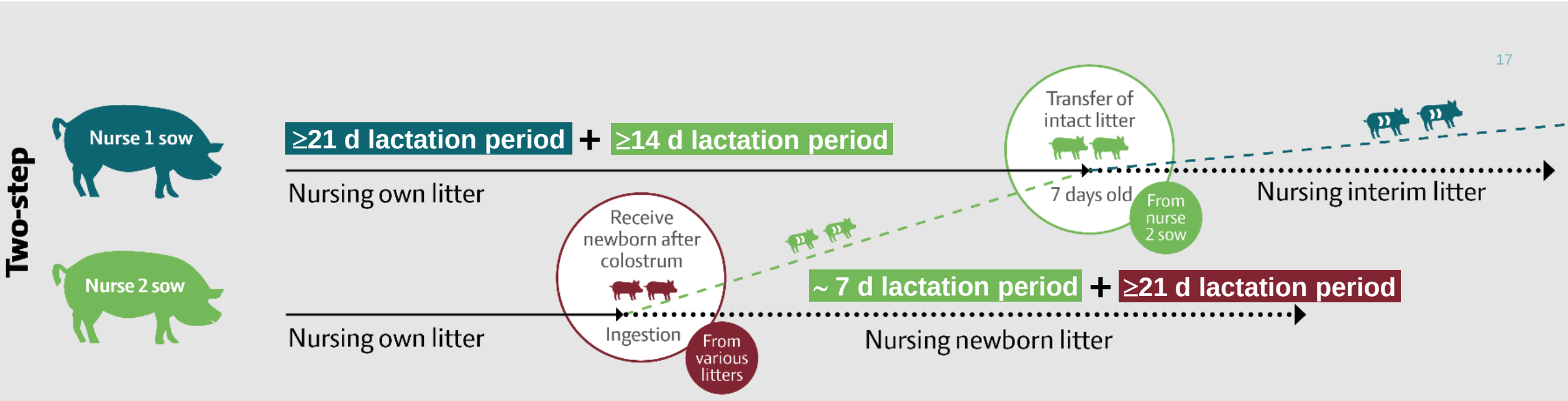
Reference: Bruun et al. (2023): *Molecular Reproduction and Development*. mrd.23688



Reference: Bruun et al. (2023): *Molecular Reproduction and Development*. mrd.23688

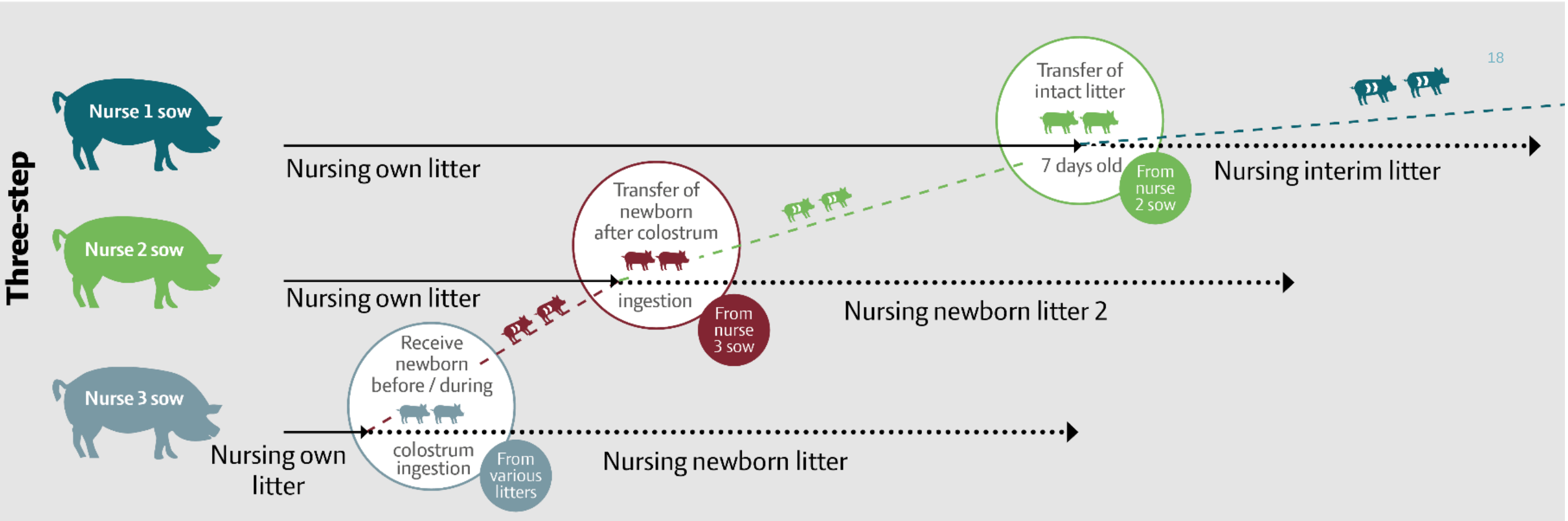


Reference: Bruun et al. (2023): *Molecular Reproduction and Development*. mrd.23688



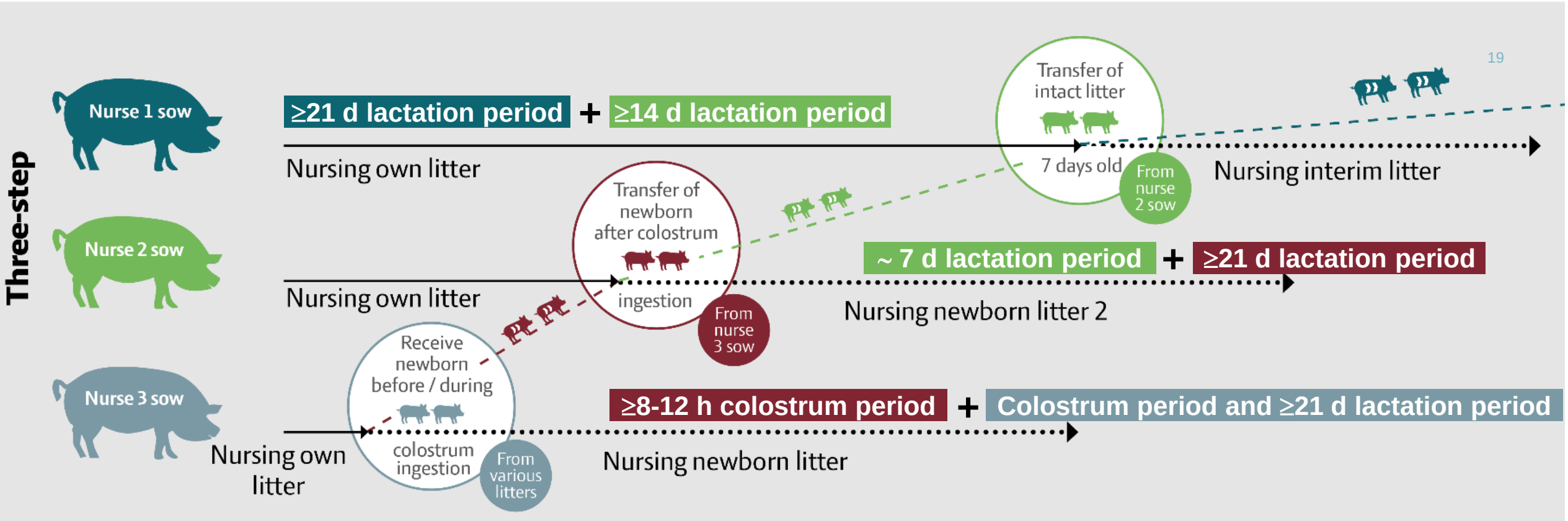
SEGES INNOVATION

Reference: Bruun et al. (2023): *Molecular Reproduction and Development*. mrd.23688



SEGES INNOVATION

Reference: Bruun et al. (2023): *Molecular Reproduction and Development*. mrd.23688



Reference: Bruun et al. (2023): *Molecular Reproduction and Development*. mrd.23688

Selecting the sow

Photo: Rasmus Bendix, Bendix Production

Sow parity
May affect preweaning mortality

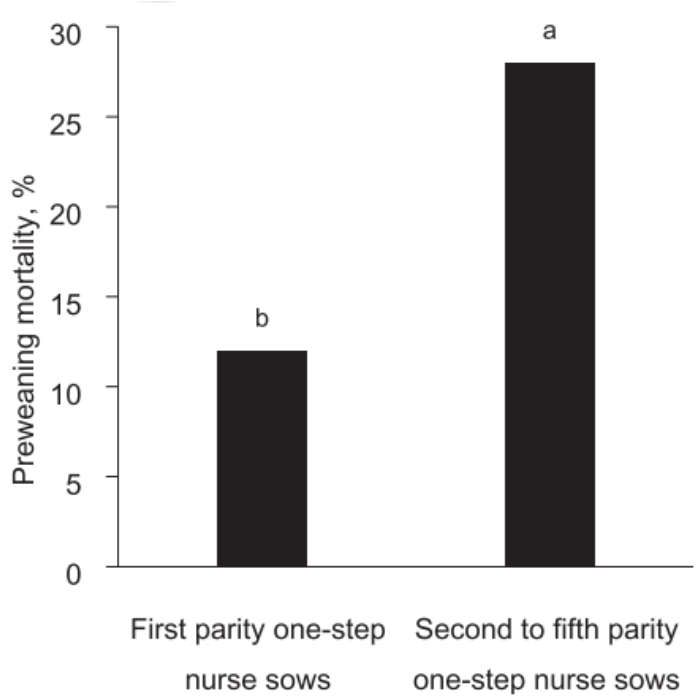


FIGURE 2 Preweaning mortality in nurse litters at first parity or second to fifth parity selected as one-step nurse sows after at least 21 days of lactation. A total of 24 nurse sows nursing 250 piglets were included in the study (Thorup, 2005).

SEGES INNOVATION

References see: Bruun et al. (2023): *Molecular Reproduction and Development*. mrd.23688

Sow parity and number of nurse sow steps

May affect preweaning mortality

Parity effect or sow weight (Weary et al., 1998; Weber et al., 2009) effect?

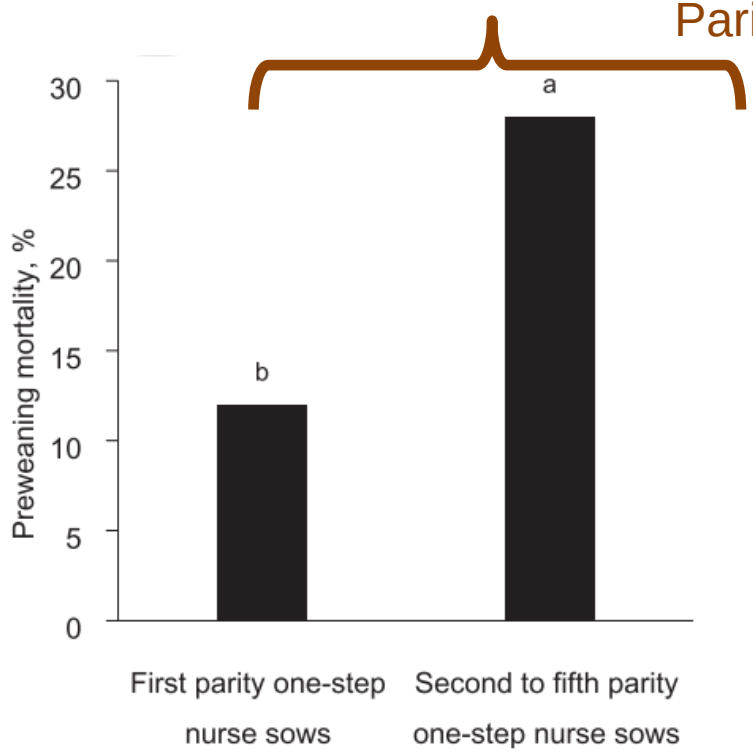


FIGURE 2 Preweaning mortality in nurse litters at first parity or second to fifth parity selected as one-step nurse sows after at least 21 days of lactation. A total of 24 nurse sows nursing 250 piglets were included in the study (Thorup, 2005).

SEGES INNOVATION

References see: Bruun et al. (2023): *Molecular Reproduction and Development*. mrd.23688

Number of nurse sow steps
May affect preweaning mortality

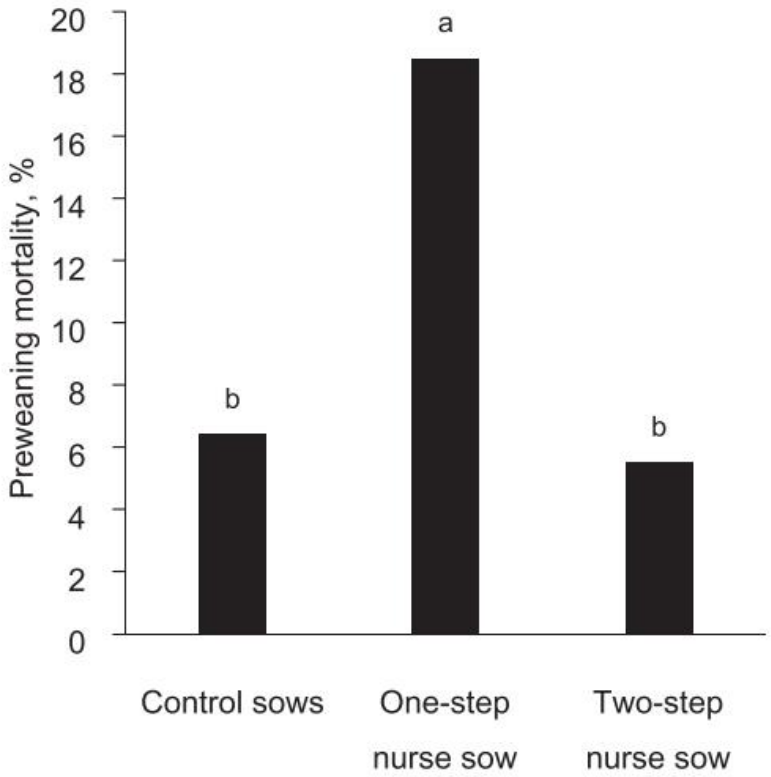


FIGURE 3 Effect of using either a one-step nurse sow or two-step nurse sow strategy compared with control sows nursing their own piglets on preweaning piglet mortality. The study included 220 piglets, 110 piglets, and 110 piglets at control sows, one-step nurse sows and two-step nurse sows, respectively (Thorup & Sørensen, 2005).

SEGES INNOVATION

References see: Bruun et al. (2023): *Molecular Reproduction and Development*. mrd.23688

Number of nurse sow steps
May affect preweaning mortality

Different lactation state when receiving new litter…

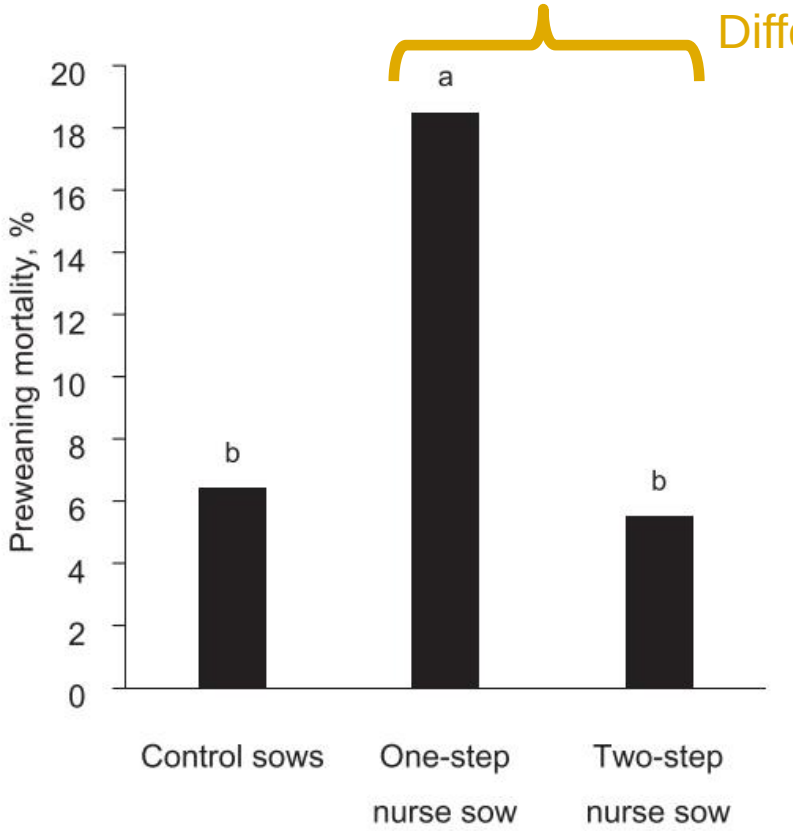


FIGURE 3 Effect of using either a one-step nurse sow or two-step nurse sow strategy compared with control sows nursing their own piglets on preweaning piglet mortality. The study included 220 piglets, 110 piglets, and 110 piglets at control sows, one-step nurse sows and two-step nurse sows, respectively (Thorup & Sørensen, 2005).

SEGES INNOVATION

References see: Bruun et al. (2023): *Molecular Reproduction and Development*. mrd.23688

Sow parity
Affects litter gain

Table 2 *Effects of parity on sow and piglet performance*

	Parity					*P*-value
	1	2	3	4	SE	Parity
n	100	206	156	103		
Litter size at weaning	13.2	13.1	12.9	12.9	0.17	NS
ADG piglet (g/day)	188^{b}	223^{a}	229^{a}	229^{a}	4.09	***
ADG litter (kg/day)	2.55^{b}	2.97^{a}	3.04^{a}	3.02^{a}	0.06	***

Several other studies support that milk yield of 1st parity sows is lower than in multiparous sows

SEGES INNOVATION

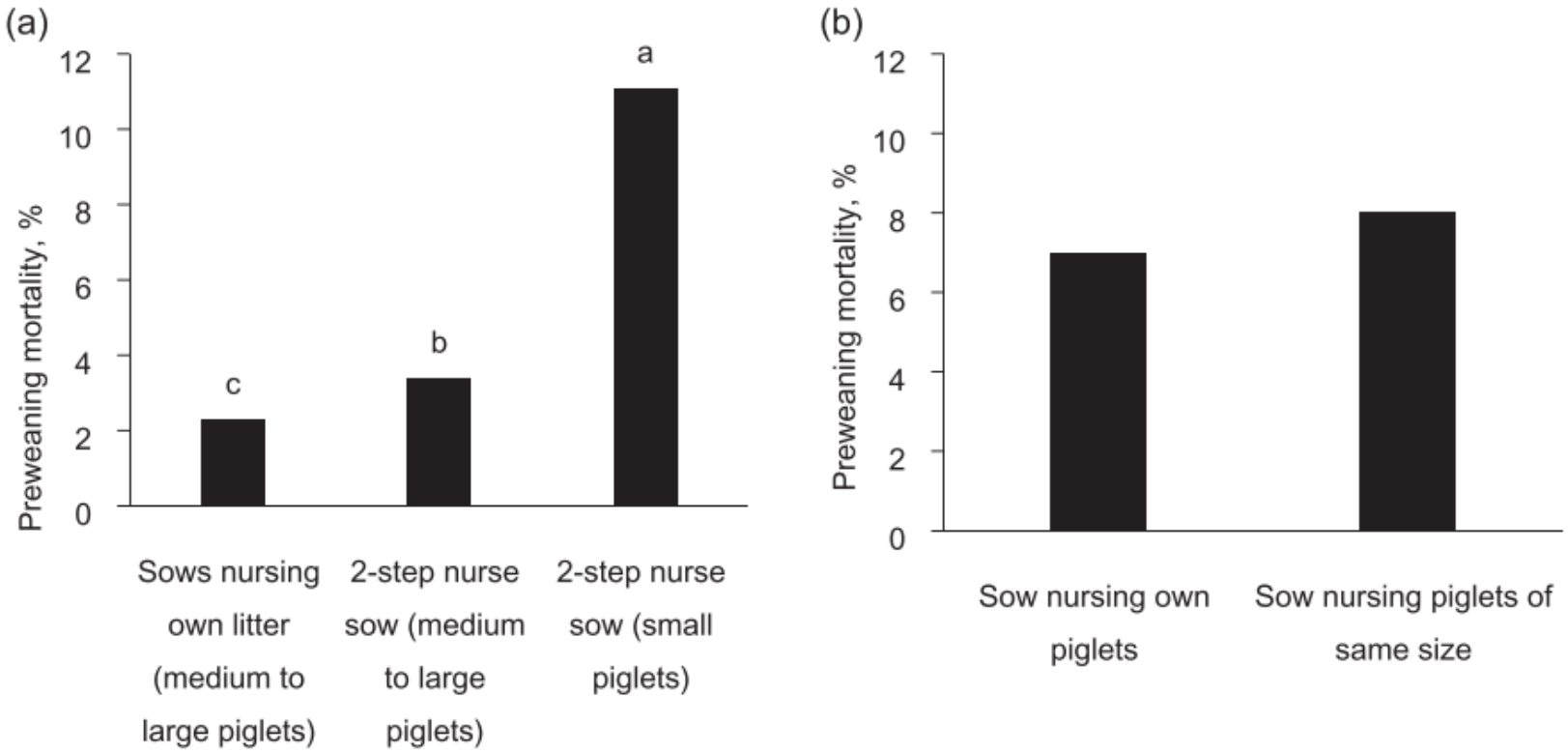
Reference: Strathe et al. (2017): *Animal.* 11: 1913-1921.

Selecting the piglets

Photo: Rasmus Bendix, Bendix Production

Creating an uniform litter

Essential to increase survival rate at the smallest piglets

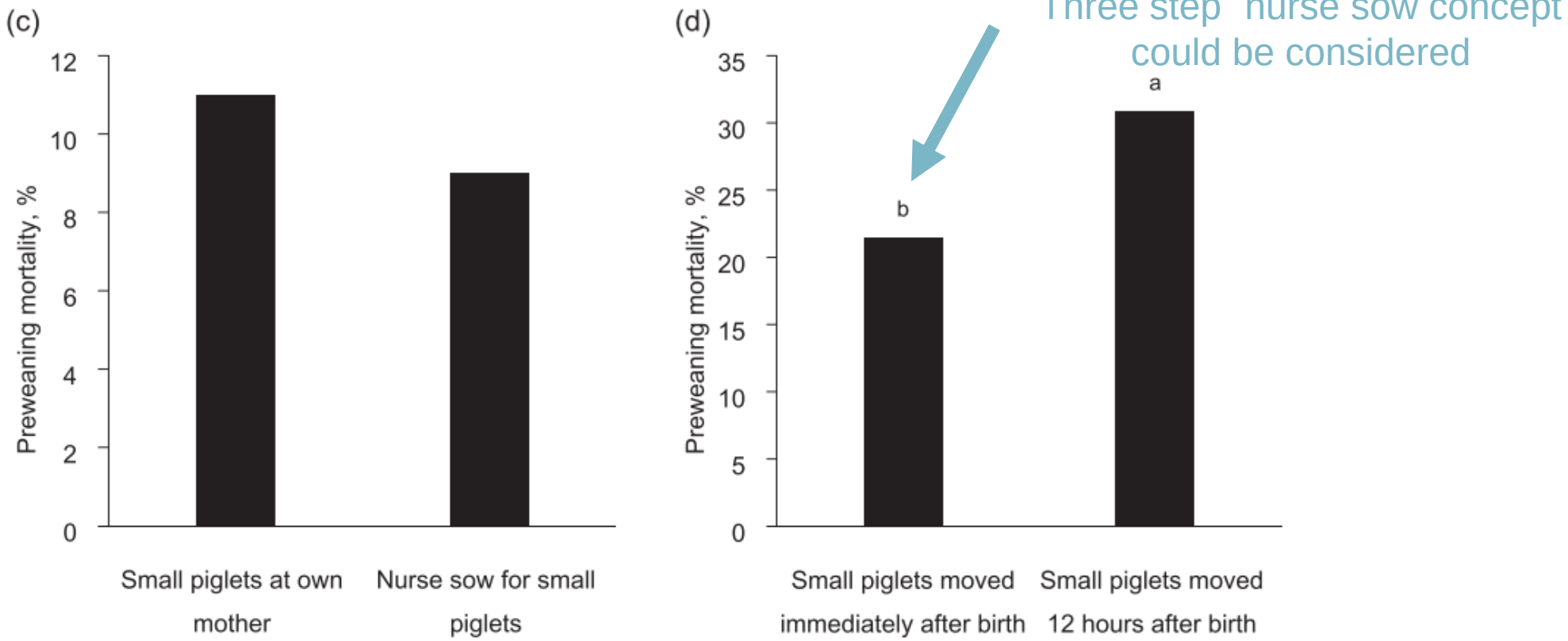


Preweaning mortality (a) in a study by Pedersen et al. (2021) based on piglets reared by own mother (823 litters), surplus piglets reared by two-step nurse sows (266 litters), and two-step nurse sows rearing small piglets from litter equalization until 4 days after litter equalization (182 litters). Preweaning mortality (b) reported by Thorup and Nielsen (2018) for piglets reared by own mother (227 litters) or in uniform nurse litters at two-step nurse sows (224 litters).

SEGES INNOVATION

References see: Bruun et al. (2023): *Molecular Reproduction and Development*. mrd.23688

Should small piglets stay at their mother?
Or should we construct uniform litters?



litters at two-step nurse sows (224 litters). Preweaning mortality (c) for small piglets reared by own mother (following 140 piglets in 56 litters) or reared by two-step nurse sows (following 209 piglets in 15 litters) rearing small piglets (Thorup & Nielsen, 2017). Preweaning mortality in the small study of Thorup and Lybye (2012) (d) of piglets moved to a three-step nurse sow immediately after birth (121 piglets in 11 litters) or at litter equalization 12 h after birth (123 piglets in 11 litters).

SEGES INNOVATION

References see: Bruun et al. (2023): *Molecular Reproduction and Development*. mrd.23688

Health aspects

- Moving the sow or the piglets?
  - Transmission of swine flu and/or PRRS Garrido-Mantilla et al. (2020)
  - Nurse sows are not complying with McREBEL™ (Management Changes to Reduce Exposure to Bacteria to Eliminate Losses from PRRS) McCaw (1995)

SEGES INNOVATION

References see: Bruun et al. (2023): *Molecular Reproduction and Development*. mrd.23688

Litter gain

Disturbing an intact litter

- Moving piglets after establishment of teat order compromizes litter gain
  Calderón Díaz et al. (2018) DePassillé et al. (1988) Robert & Martineau (2001)
- Moving the sow reduced weaning weight with 0.4 kg
  Thorup and Sørensen (2006)
- Having less uniform litters affects the small piglets (survival/gain)
  Huting et al. (2017)

SEGES INNOVATION

References see: Bruun et al. (2023): *Molecular Reproduction and Development*. mrd.23688

Subsequent reproduction

Photo: Rasmus Bendix, Bendix Production

Concerns about subsequent reproduction in nurse sows

Excess mobilization during lactation?

- Backfat mobilization occurs mostly in early lactation
  Strathe et al. (2017b)
- Low feed intake throughout lactation is the major concern
  Hoving et al. (2012); Zak et al. (1997); Strathe et al. (2017a,b)
- Management and focus on optimizing feed intake is required

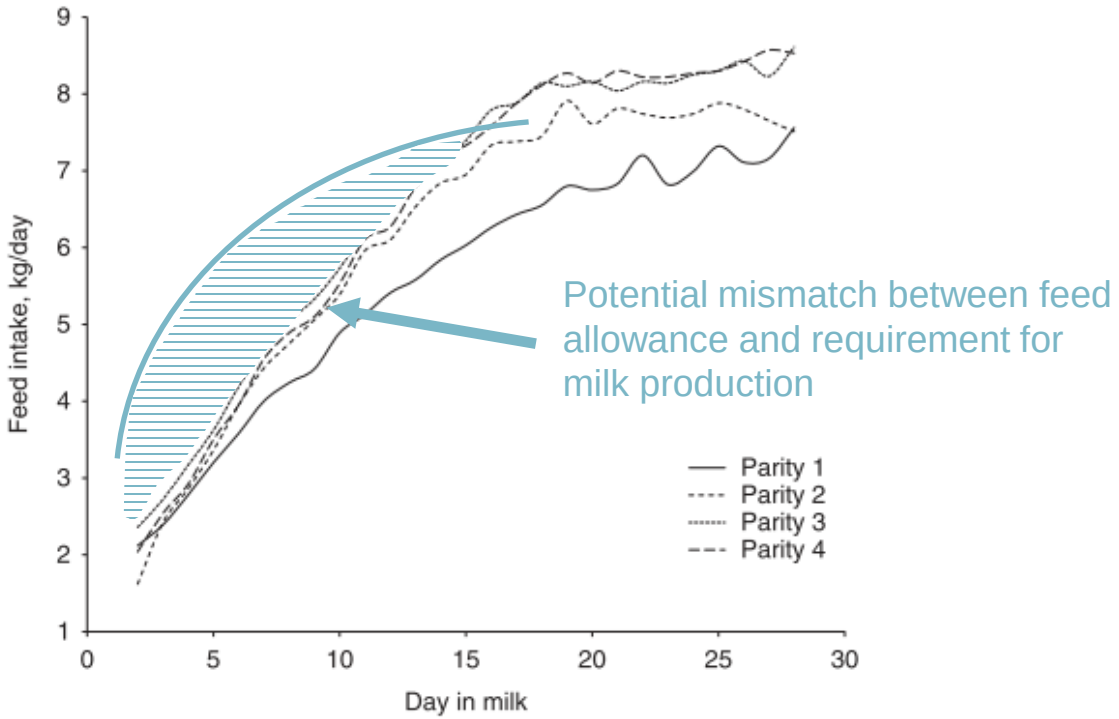


Figure 1 Feed allowance was registered daily for individual sows and feed allowances (kg/day) for parity 1 to 4 sows are given from litter standardization to weaning. Strathe et al. (2017b)

SEGES INNOVATION

References see: Bruun et al. (2023): *Molecular Reproduction and Development*. mrd.23688

Concerns about subsequent reproduction in nurse sows

Lactational oestrus

- Caused by receiving younger piglets → sudden drop in milk consumption
  Thorup (2008)
  - Can partly be counteracted by short term feed restriction
- Caused by changes in litter dynamics equal to intermittent suckling
  Langendijk et al.(2009); Soede et al. (2012); van Wettere et al. (2017)
- Moving the sow to a new pen → stressful
  van Wettere et al. (2017)

SEGES INNOVATION

References see: Bruun et al. (2023): *Molecular Reproduction and Development*. mrd.23688

Concerns about subsequent reproduction in nurse sows

Delayed or changed oestrus patterns after weaning

- Nurse sows had +0.04 days from weaning to service
  Bruun et al. (2016)
  - Due to 8% sows less serviced 0-7 days post weaning
- Changes in oestrus patterns in nurse sows in different parities Iida et al. (2019)
  - More sows serviced 0-3 days post weaning and 7-20 days post weaning

SEGES INNOVATION

References see: Bruun et al. (2023): *Molecular Reproduction and Development*. mrd.23688

Positive side-effects of prolonged lactation period

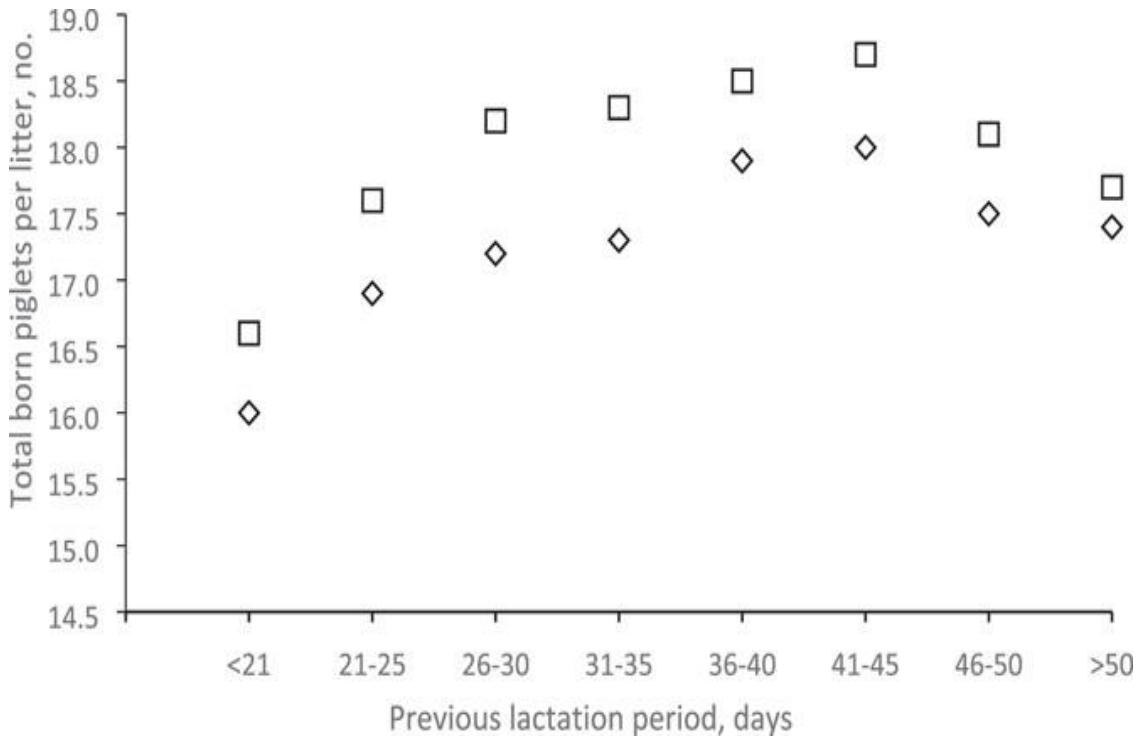


FIGURE 5 Average number of total born piglets per litter (2012) dependent on the length of previous lactation period for second parity sows (♢) and third to eighth parity sows (□) from 10 Danish herds (16,141 farrowings) selected by high productivity (Thorup et al., 2014).

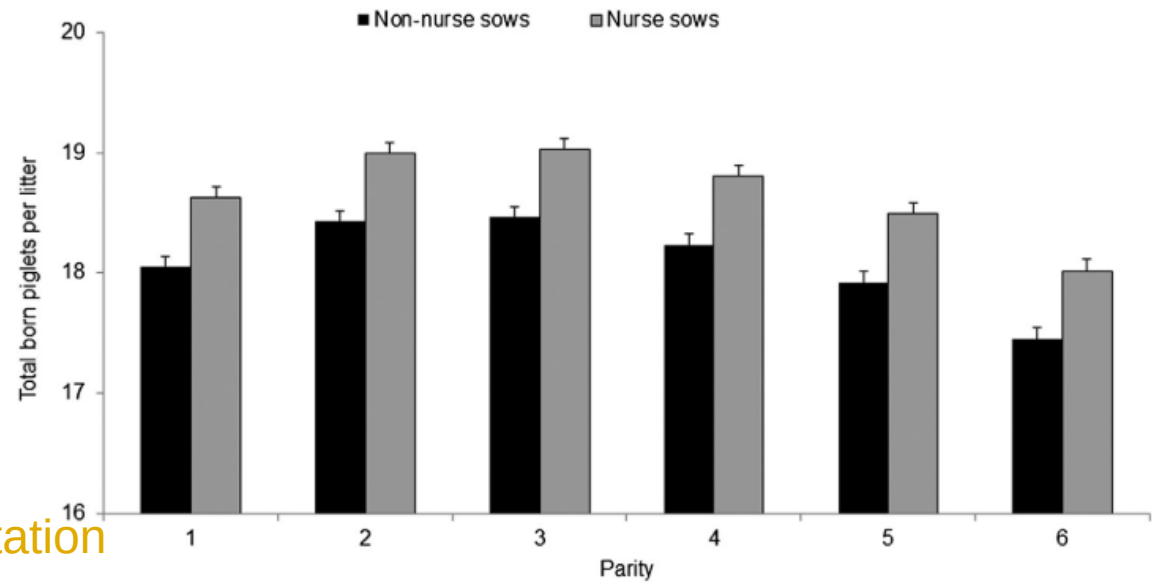
SEGES INNOVATION

Reference: Thorup et al. (2014): *Report no. 11404.* Available at www.svineproduktion.dk [in Danish]

Positive side-effects of prolonged lactation period

Item	Non-nurse	Nurse sow	SEM	P value
First farrowing				
Farrowings, n	63,248	16,616		
Parity	3.27	3.12	0.05	0.001
Own litter				
Live born/litter	15.87	15.94	0.09	0.273
Still born/litter	1.78	1.66	0.06	0.001
Weaned/litter	11.65	12.41	0.13	0.001
Lactation length, days	27.43	22.75	0.46	0.001
Foster litter				
Weaned/litter	na	11.48	0.18	
Lactation length, days	na	17.73	0.70	
Subsequent farrowing				
Removed before mated[a]				
n	8915	2005		
%	15.71	14.80	1.01	0.001
Mated				
n	54,333	14,611		
Farrowings				
n	51,137	13,908		
Total born piglets in the	18.11	18.69	0.04	0.001

+13.05 days per lactation



+0.58 total born piglets per litter

SEGES INNOVATION

Reference: Bruun et al. (2016): *Theriogenology.* 86: 981-987

Alternatives to nurse sows

Photo: BoPil

Supplementing sow milk with artificial milk
Exceeding the nursing capacity of the sow

Litter size	14	16	18	SEM	P-value
N	64	66	65		
Functional teats, no.	14.4	14.5	14.6	0.1	NS
Preweaning mortality, %	3.7[a] [2.2;5.5]	9.6[b] [7.2;12.4]	11.5[b] [8.8;14.5]	-	<0.001
Litter size day 21, no.	13.1[a]	13.7[b]	15.3[c]	0.2	<0.001
Average piglet weight day 21, kg	6.2[a]	5.8[b]	5.3[c]	0.1	<0.001

SEGES INNOVATION

Reference: Pedersen & Nielsen (2017): *Report no. 1116.* Available at www.svineproduktion.dk [in Danish]

Supplementing sow milk with artificial milk
Exceeding the nursing capacity of the sow

Litter size	14	16	18	SEM	P-value
N	64	66	65		
Functional teats, no.	14.4	14.5	14.6	0.1	NS
Preweaning mortality, %	3.7[a] [2.2;5.5]	9.6[b] [7.2;12.4]	11.5[b] [8.8;14.5]	-	<0.001
Litter size day 21, no.	13.1[a]				<0.001
Average piglet weight day 21					<0.001

Supported by Kobek-Kjeldager et al. (2019)

Increasing litter size from 14 to 17 piglets increased the odds ratio of dying during lactation from 1.0 to 2.0 [1.23;3.28] (P<0.01)

SEGES INNOVATION

Reference: Kobek-Kjeldager et al. (2019): *Animal*.14:824-833.

Conclusions

- When using nurse sows following should be preferred:
  - Two-step nurse sows
  - Sow should be in good body condition having a good appetite
  - Teats suitable for the nursing litter
  - Chosing the right parity sows seems to be a challenge
  - Constructing an uniform nursing litter is crucial
  - Leaving room for the piglets to stay in the section

SEGES INNOVATION

Conclusions

- When using nurse sows following should be preferred:
  - Two-step nurse sows
  - Sow should be in good body condition having a good appetite
  - Teats suitable for the nursing litter
  - Chosing the right parity sows seems to be a challenge
  - Constructing an uniform nursing litter is crucial
  - Leaving room for the piglets to stay in the section
- Subsequent reproduction of nurse sows
  - No worries except for slightly delayed onset of oestrus in some sows
  - Can be counteracted partly by a 1-2 day feed restriction in Nurse 1 sows
  - More live born piglets per litter as the lactation period is extended

SEGES INNOVATION

Questions

Photo: Rasmus Bendix, Bendix Production