Calving Management Practices for Dairy Herds

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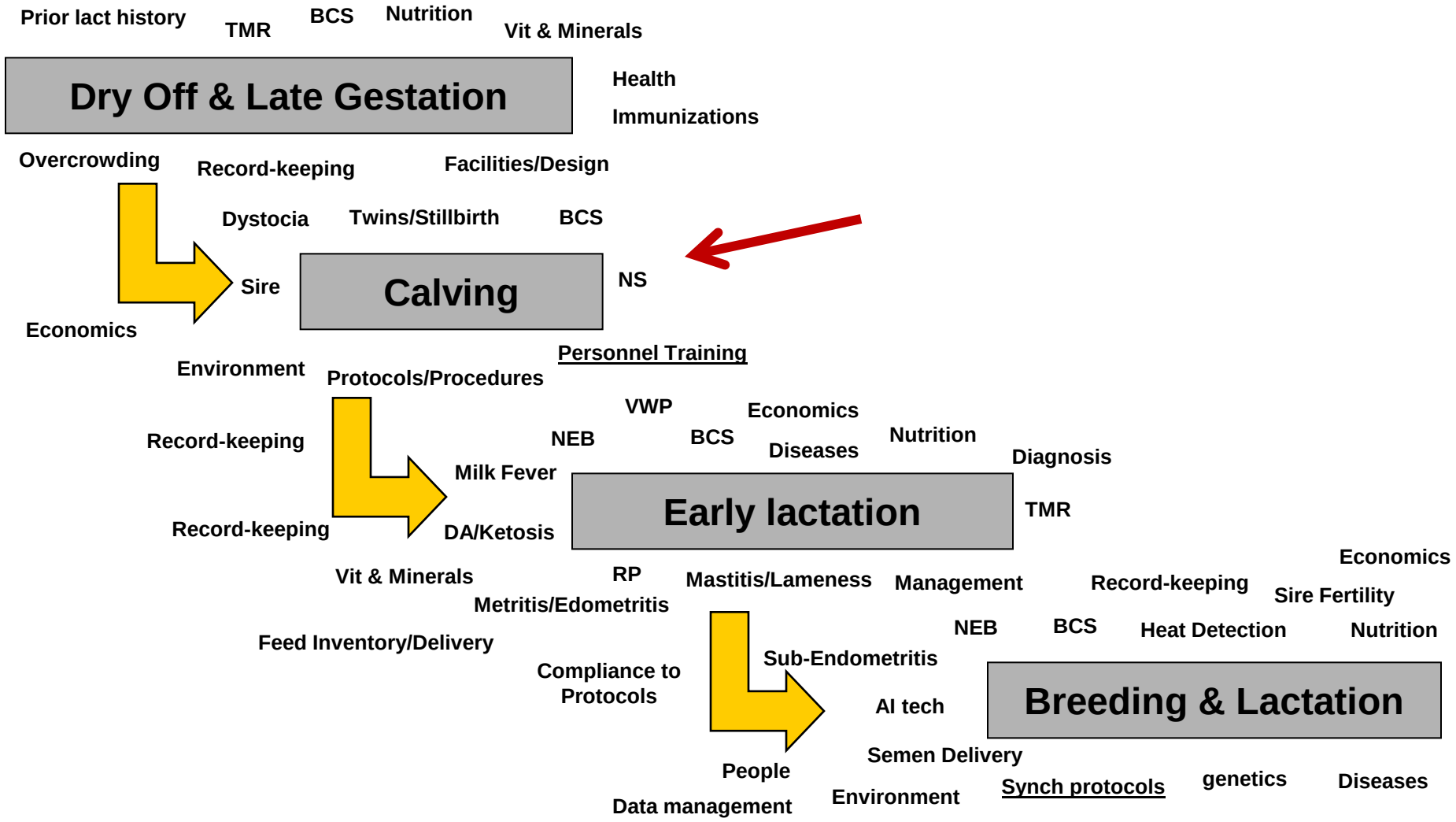
Objectives

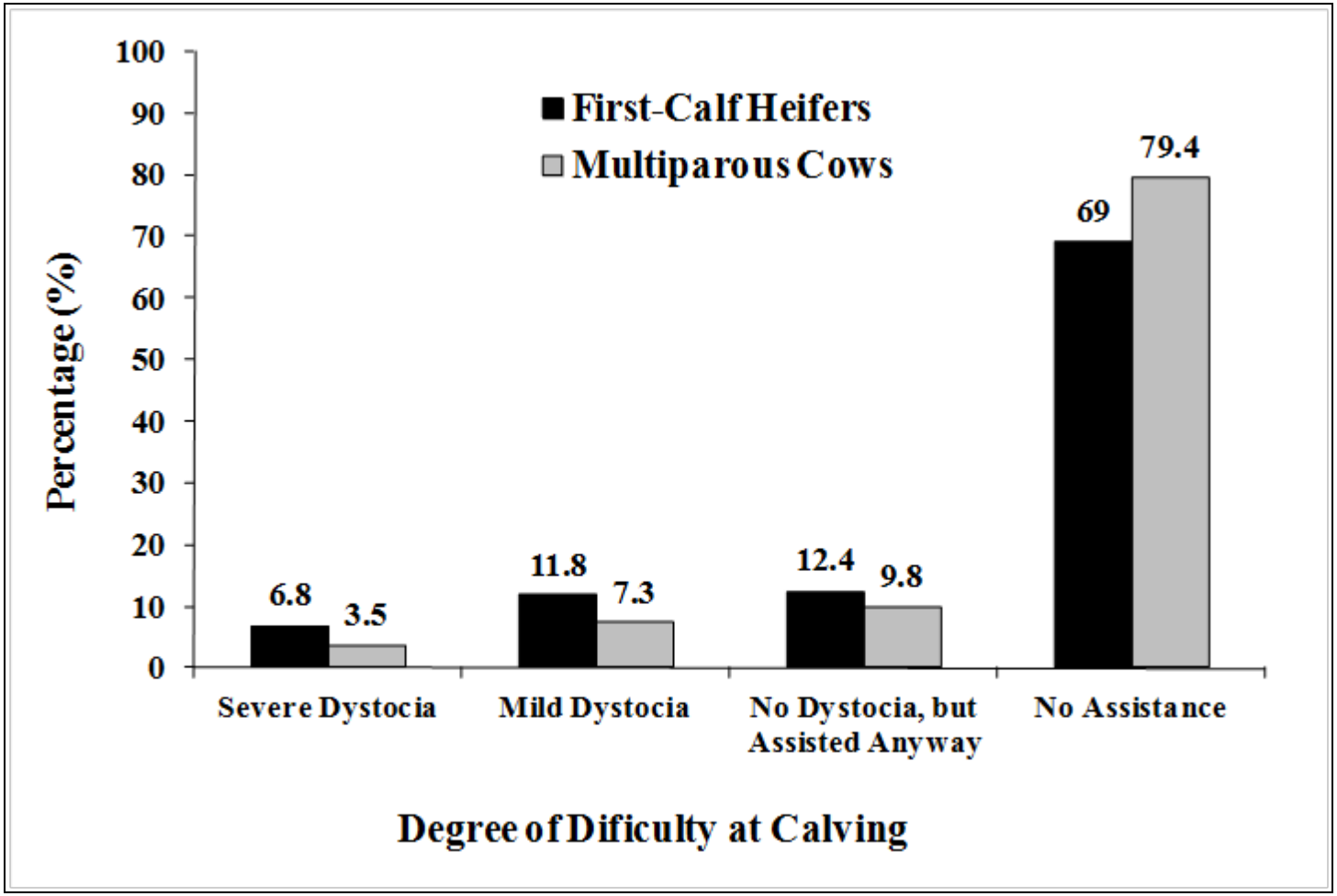
- Recognize the imminent signs of birth and calving progress
- Provide guidelines for calving management practices to reduce the prevalence of stillbirth and metritis under field conditions
- Be able to determine when first-calf heifers or cows need assistance at calving
- Be able to record calving-related events

Please note that the information provided herein may or may not apply to all situations. Consult with your herd veterinarian for more information.

Transition Period: What, How, Why, & When?



Frequency of Dystocia



(USDA. 2010. USDA:APHIS:VS, CEAH. Fort Collins, CO.)

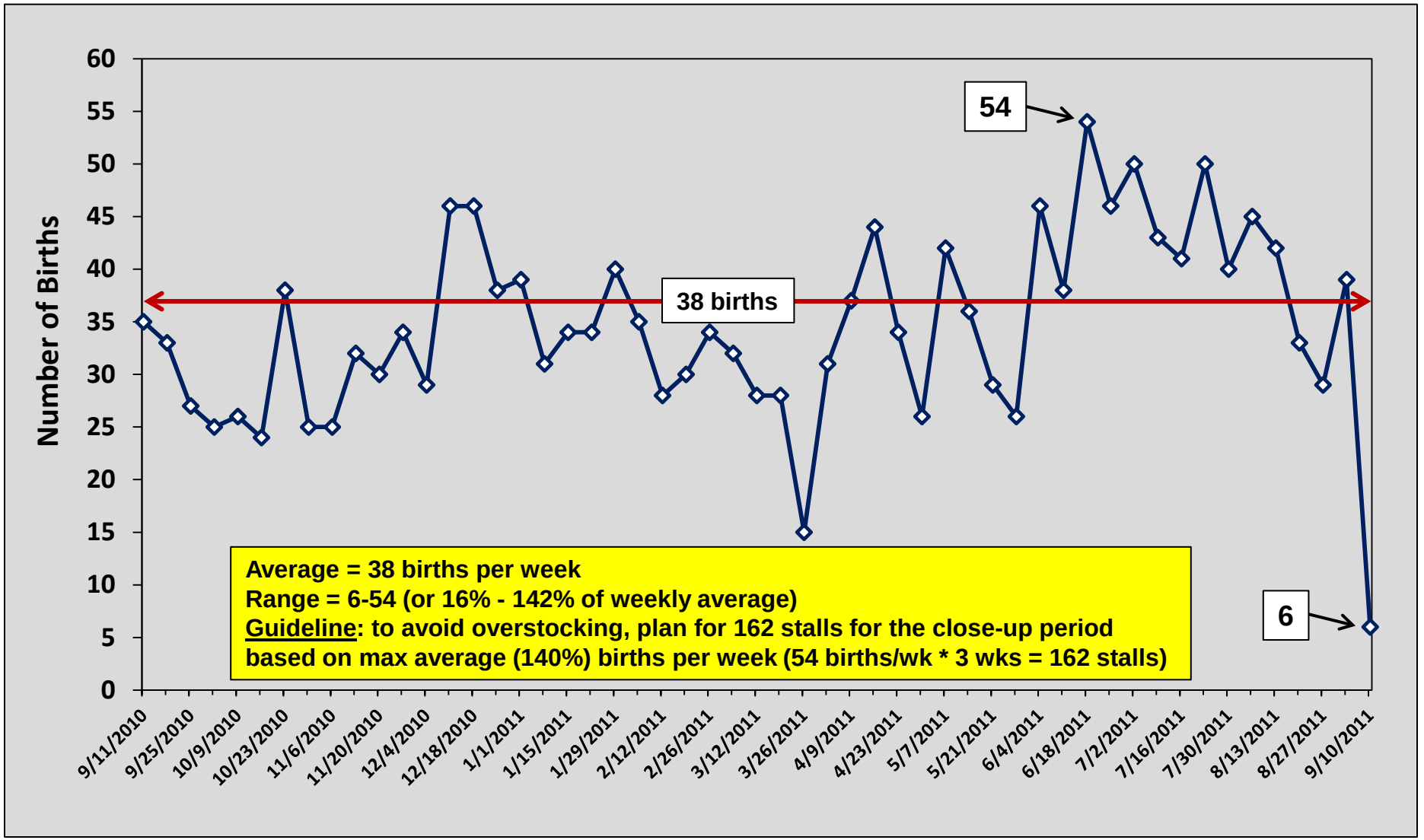
Maternity Pen or Area

- **Guidelines:**
  - **At least 175 ft^2 (16 m^2) per cow**
  - **<u>Flooring</u>: sand, dirt, or clay**
  - **<u>Bedding</u>: straw (6-10 in deep), change frequently to keep it dry and clean**
  - **Well-ventilated**
  - **Adequate lighting**

Sizing the Close-Up Pen

- **Example: 2000-cow herd**
- **Determine the time period (3 wks) and size of close-up pen (# of stalls)**
  - **2000/365 = average 5.5 births per day**
- **How many calving per week?**
  - **5.5 births/d * 7 d = ~38 births per week**
- **How long is the close-up period?**
  - **38 births * 3 wks = ~115 births for the 3-wk close-up period**

Sizing the Close-Up Pen



Management of Close-Up Cows

- Although “average” births per week is a valuable metric, most producers are faced with calving “ranges”
- All these calculations assume cow grouping at dry-off and “calving date” is known
- Add additional challenges for no-calving dates (bull bred first-calf heifers or cow, missing records, or unknown pregnancy status)

Parturition

- Parturition is a process initiated by a cascade of hormonal and physical changes at the end of gestation (~280 days in cattle)
- Three stages:
  - Stage I (dilation of birth canal)
  - Stage II (labor or calf expulsion)
  - Stage III (passing fetal membranes)
- It progresses gradually from one stage to the next!

(Noakes et al., 2001; Schuenemann et al., 2013)

Stage I

- Stage I consists of the dilation of the birth canal (soft tissues and ligaments)
- Restless behavior: Walk, transition from laying to standing positions, kick the belly, vocalization, tail raised, urinate, …
- Physical changes: Udder is full, dilation of vulvar ring, …
- It ends with a fully dilated cervix and the appearance of the amniotic sac (AS) or “water bag” outside the vulva

Stage II

- **<u>Stage II</u> begins with a fully dilated cervix, the appearance of the "water bag", and abdominal contractions are evident**

Stage III

- **<u>Stage III</u> is the expulsion of the fetal membranes, which occurs around 8-12 hours post calving. If >24 hours, it is considered retained fetal membranes** (Kelton et al., 1998)

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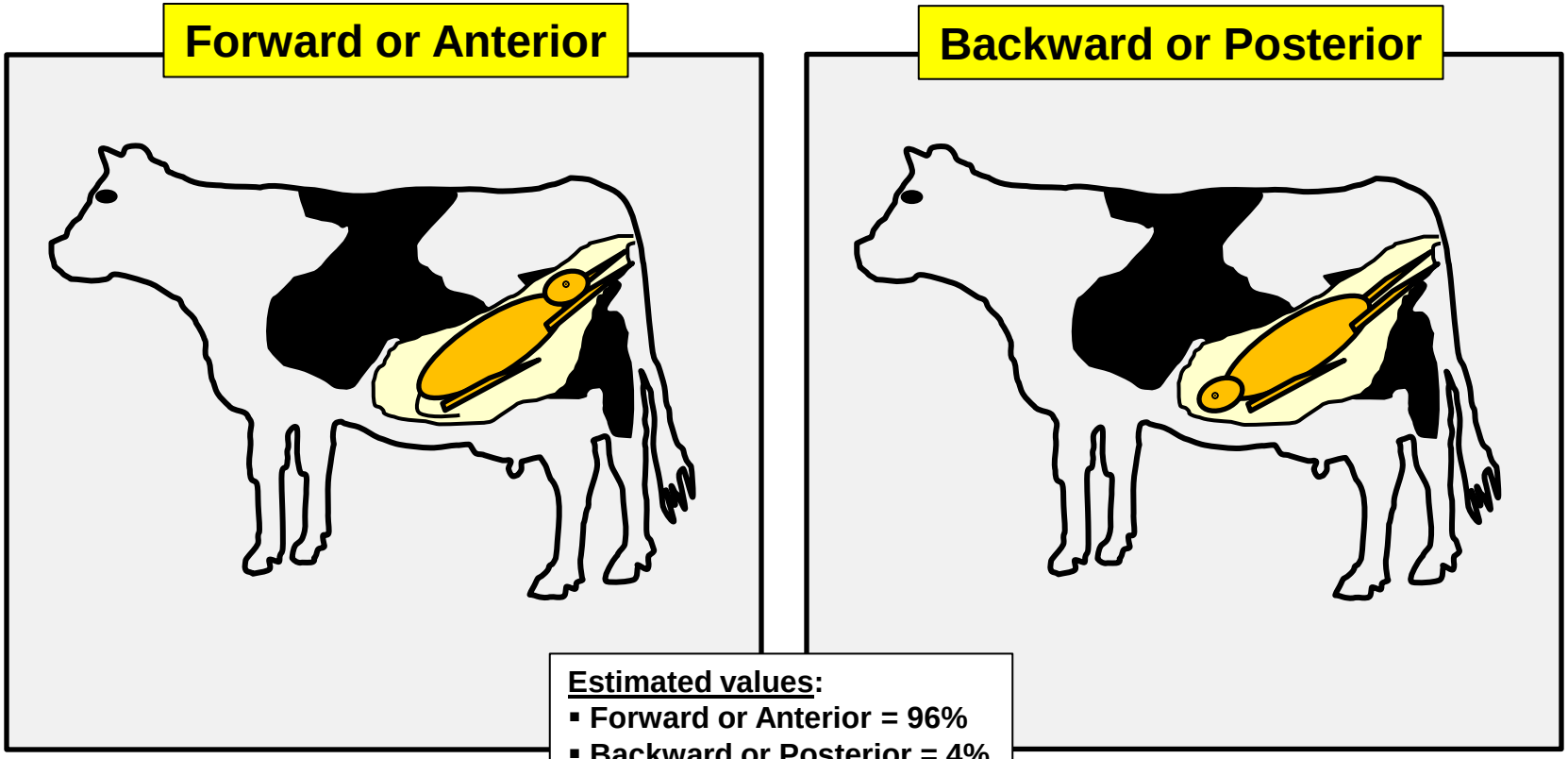
Calf Delivery

- **Presentation: It refers to whether the calf is coming forward (anterior), backward (posterior), or transverse**
- **Position: It refers to the calf's position in relation to the cow**
- **Posture: It refers to how the calf's head and limbs are in relation with its body**

(Noakes et al., 2001; Schuenemann et al., 2013)

Normal Calf Delivery



Estimated values:

- Forward or Anterior = 96%
- Backward or Posterior = 4%
- Multiple Births = 5%
- Breech = 1%

(Hunter et al., 2013)

Eutocic or Dystocic Births

- **Eutocic Birth: Normal delivery of single or multiple calves**
- **Dystocic Birth: It is defined as a difficult birth resulting in prolonged calving or severe assisted extraction of the calf at birth**

Early Signs of Calving

Cow with enlarged vulva & mucus plug

Cow with dilated vulva & enlarged udder

Imminent Signs of Calving

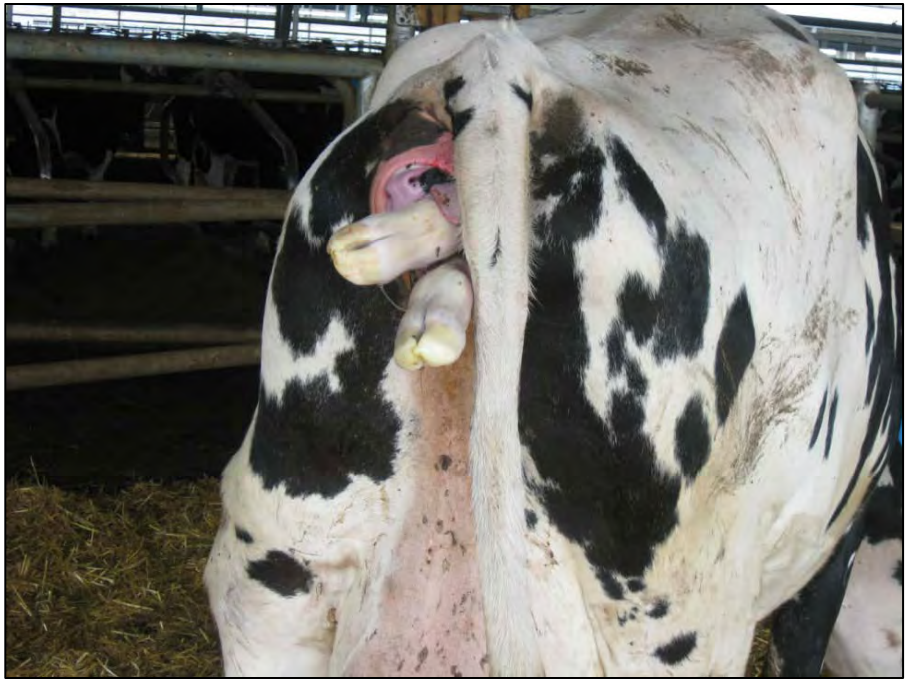
Walking, pacing, sniffing, & tail-raised

Lying down & showing feet of the calf outside the vulva

Imminent Signs of Birth

Envelops outside the vulva & tail-raised

Showing feet/nose of the calf outside the vulva



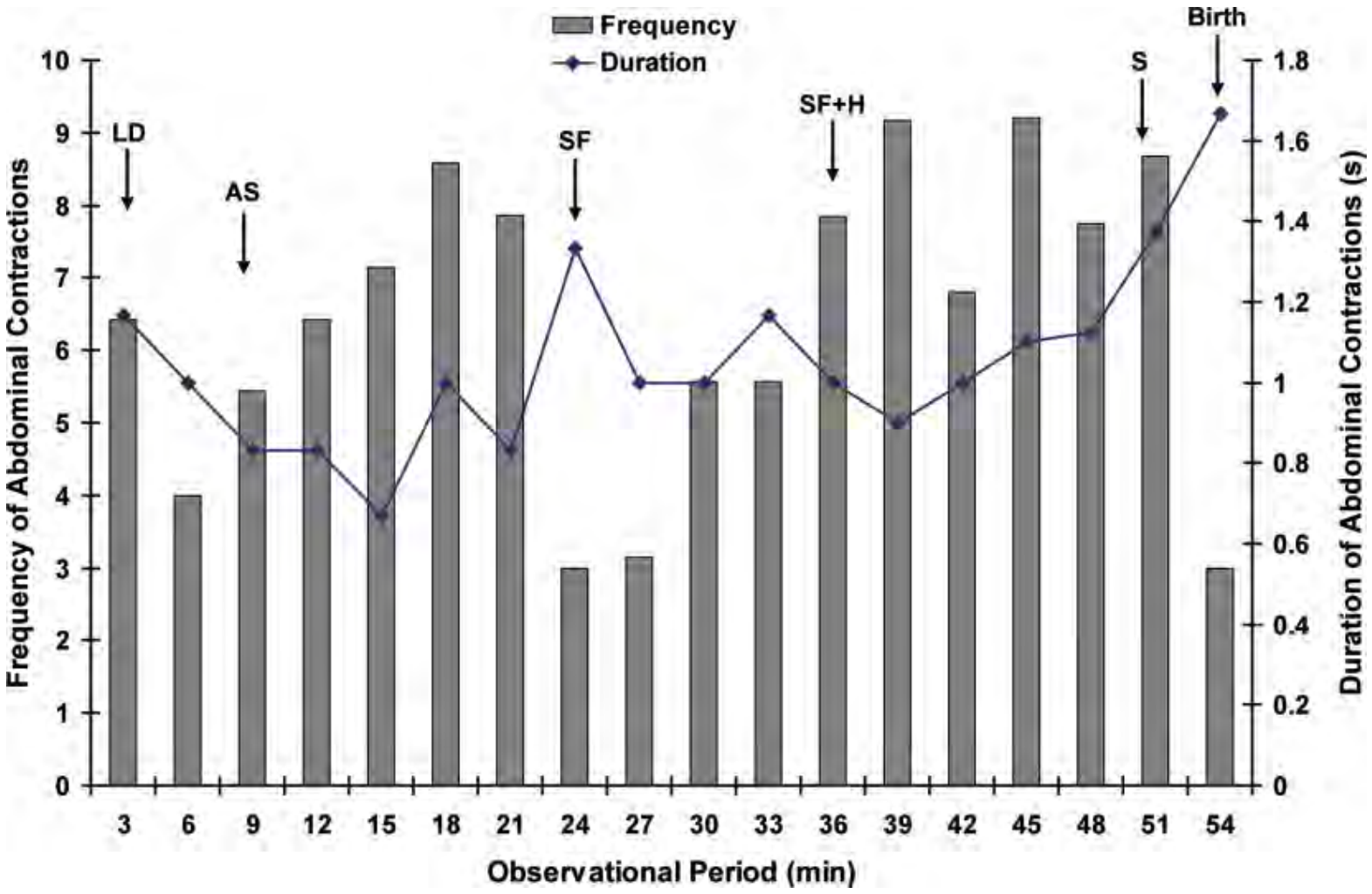
Normal Delivery

The rear legs of the calf are still in the vulva of the cow, but birth is completed

Cow recovers from labor, stand-up, & lick the calf

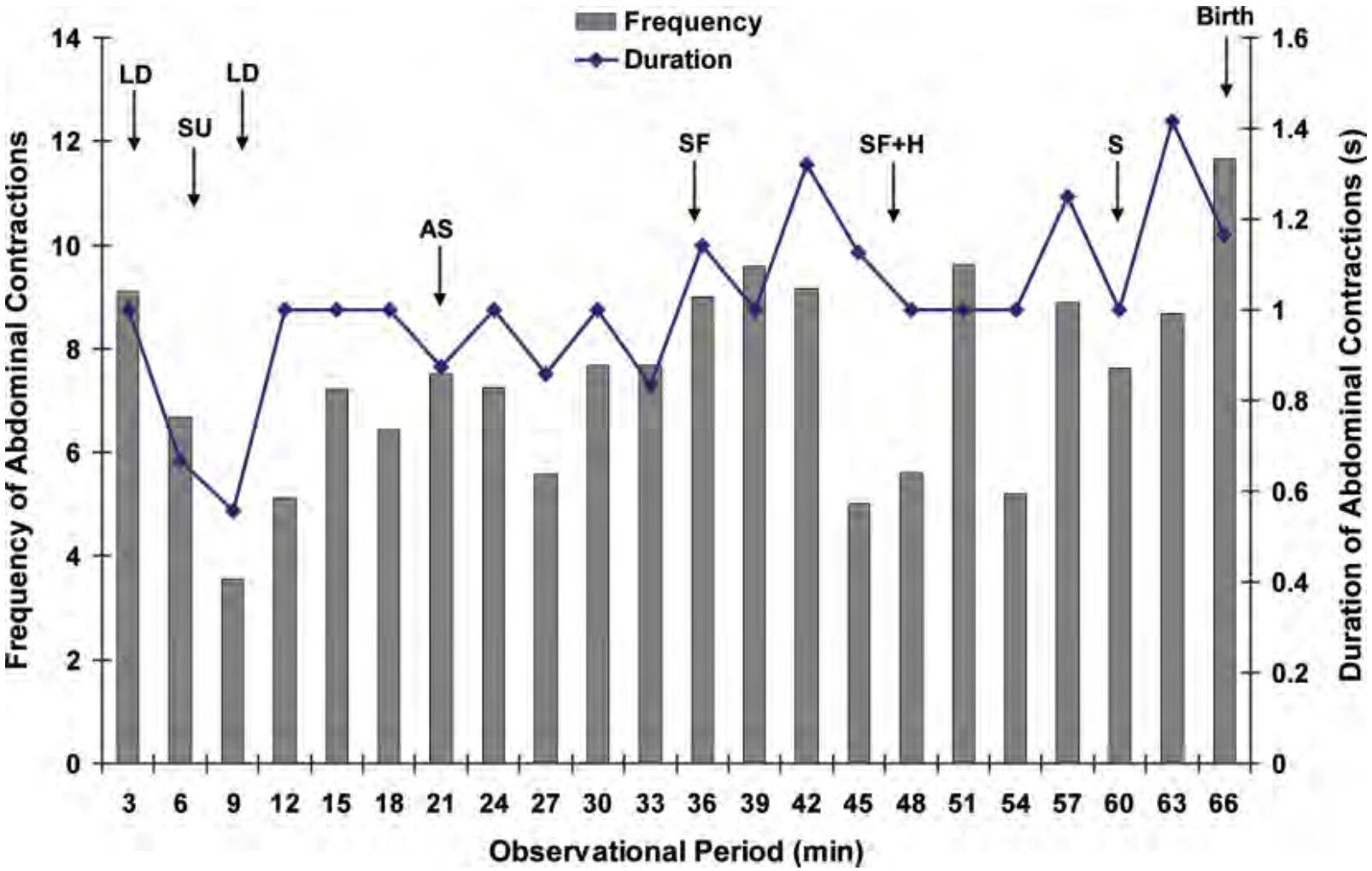
Cows: Calving Progress for Unassisted Births

(Schuenemann et al., 2011 JDS 94:5494–5501)



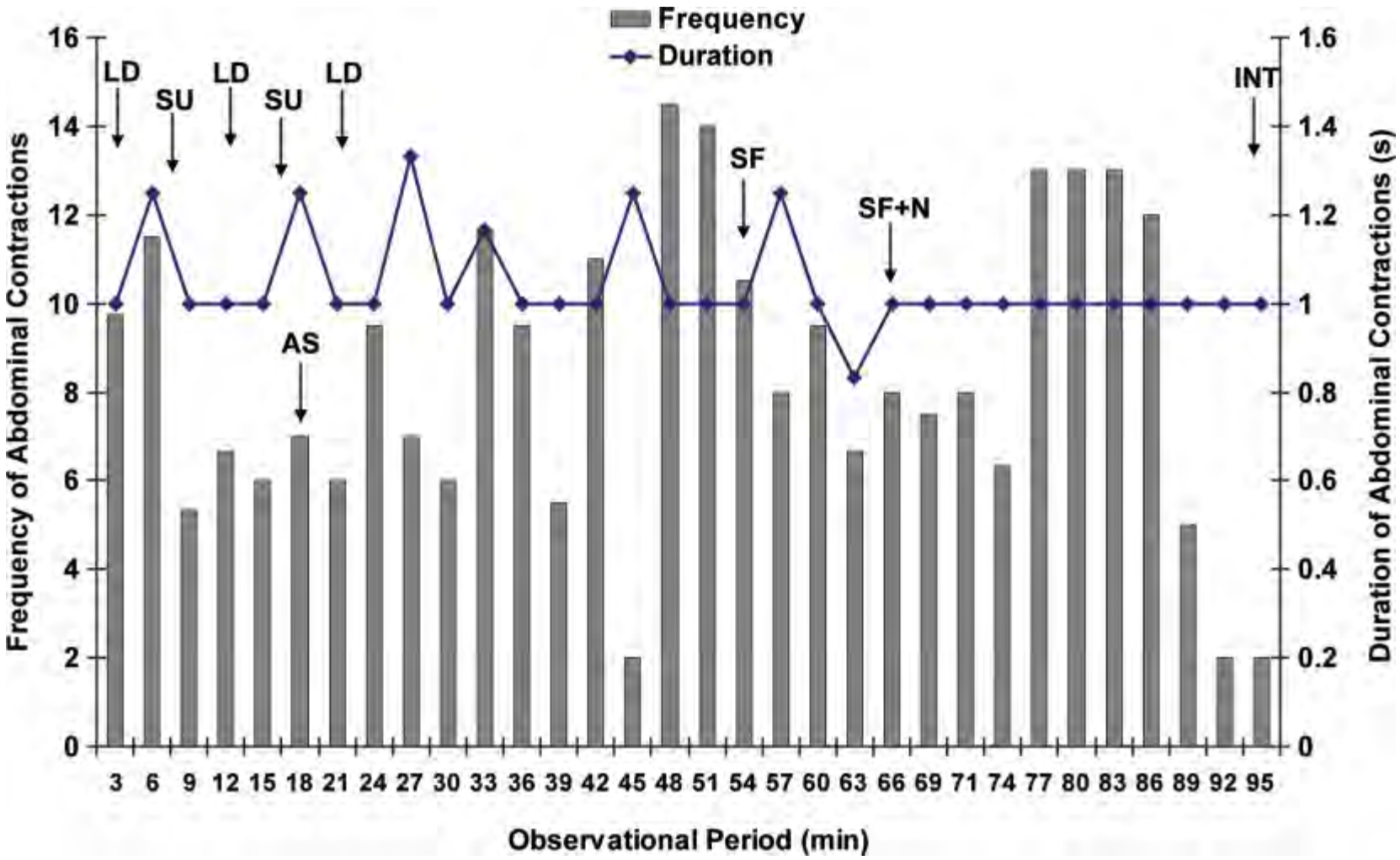
First-Calf Heifers: Calving Progress for Unassisted Births

(Schuenemann et al., 2011 JDS 94:5494–5501)



First-Calf Heifers: Calving Progress for Assisted Births

(Schuenemann et al., 2011 JDS 94:5494–5501)



Reference Signs and Values for Holstein Cattle

Signs of Normal Births	Description	References
Appearance of the AS or feet of the calf outside the vulva	Landmark references	Noakes et al., 2001 Schuenemann et al., 2011a
Signs of calving progress	Evident every 15-20 minutes	Schuenemann et al., 2011a
Mean time since the appearance of the AS outside the vulva to birth	70 minutes(*)	Noakes et al., 2001 Schuenemann et al., 2011a
Mean time since the appearance of the feet of the calf outside the vulva to birth	65 minutes(*)	Schuenemann et al., 2011a
Time that a cow or first-calf heifer is in labor (abdominal contractions)	≤2 hours	Gundelach et al., 2009 Schuenemann et al., 2011a
Frequency of observation	At least every 1 hour	Schuenemann et al., 2011a

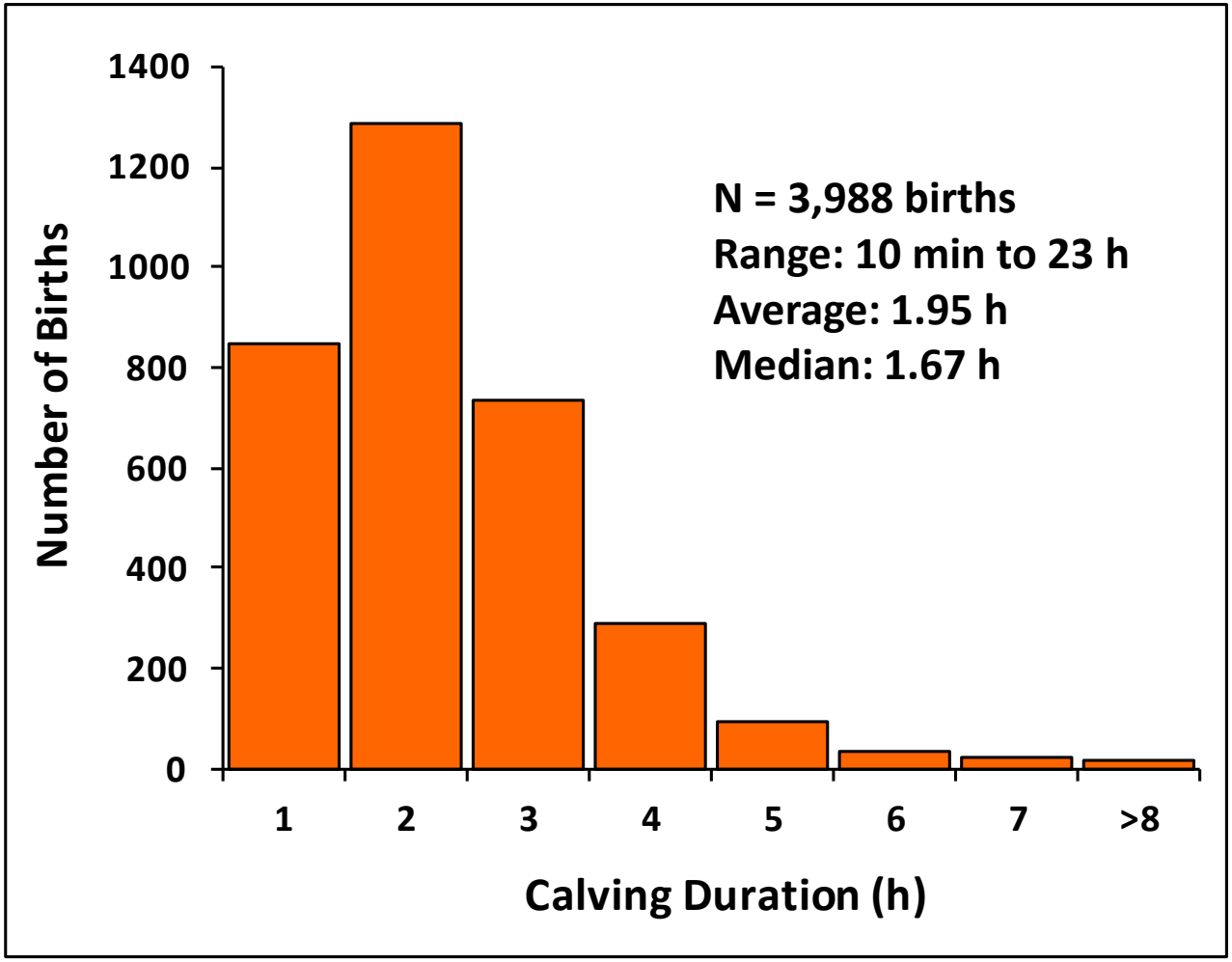
(*) The mean times were estimated using the mean + 2 SD (standard deviation)

Cow Move into Maternity Pen

- Limited research studies on cow move around parturition vs stillbirth
- For herds that group cows according to expected calving date, periparturient cows should be moved from close-up to maternity pen prior to or at the onset of labor (appearance of AS outside the vulva)
- Frequency of observation and personnel skills

Cow showing "water bag" outside the vulva (Stage II or onset of labor)

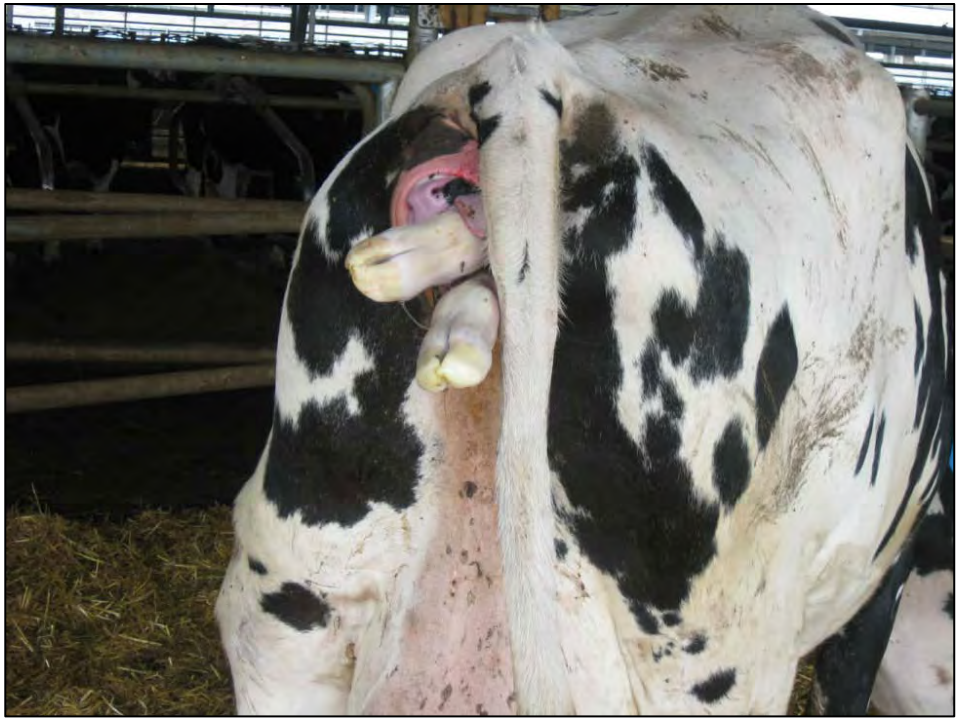
Length of Time in Maternity Pen



Landmarks of Imminent Birth

Appearance of the "water bag" outside the vulva

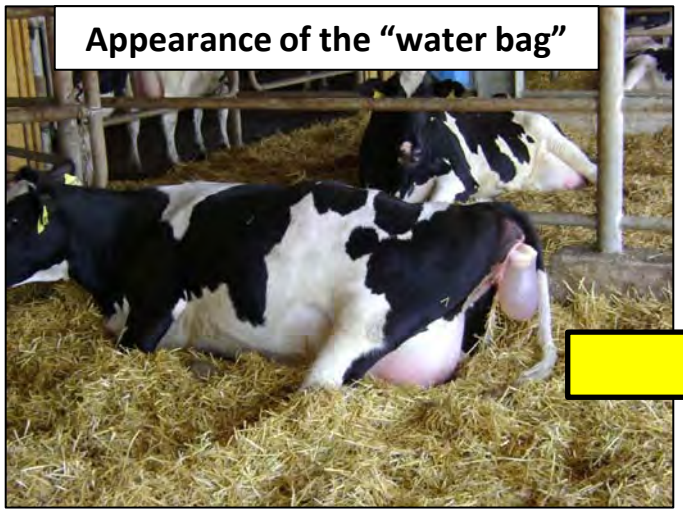
Appearance of the feet of the calf outside the vulva



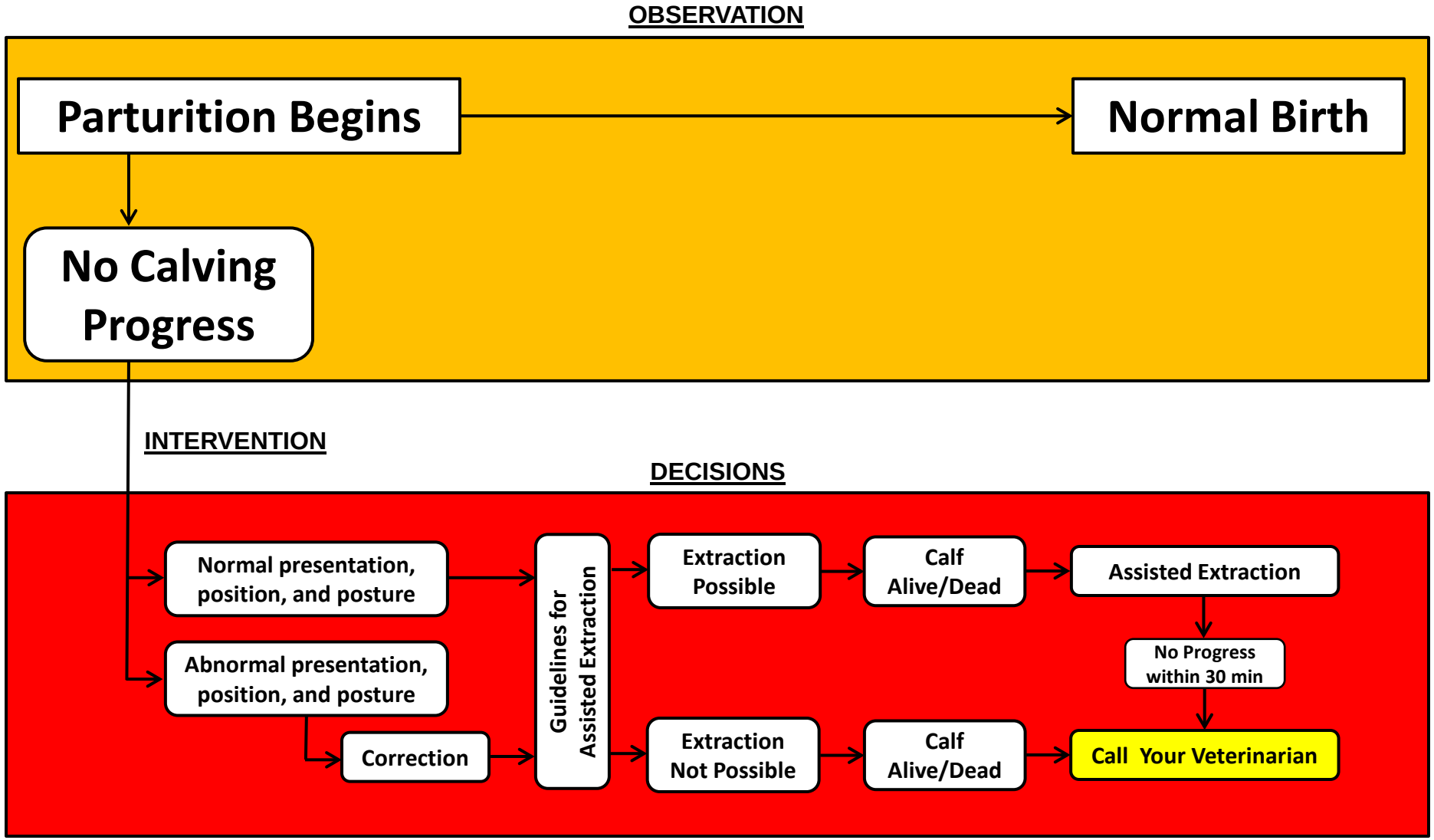
Is the Calf Coming Backward?

- Both rear legs or front legs?
- Will the calf fit into the birth canal?
- Monitor progress!
- …

Monitor Calving Progress

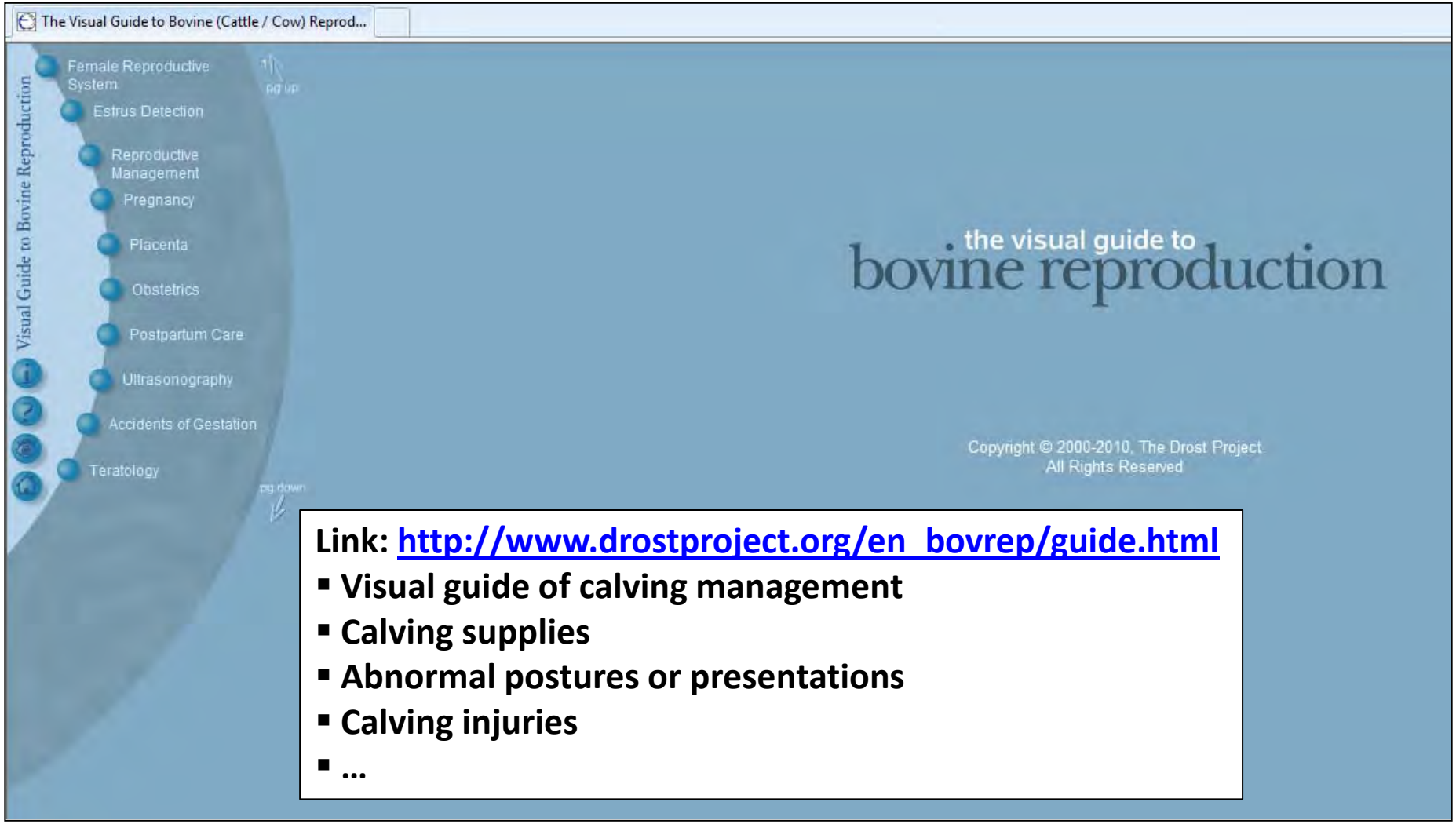


Guidelines for Assisted Births



(Adapted from Schuijt and Ball, 1980)

Guidelines for Obstetrics



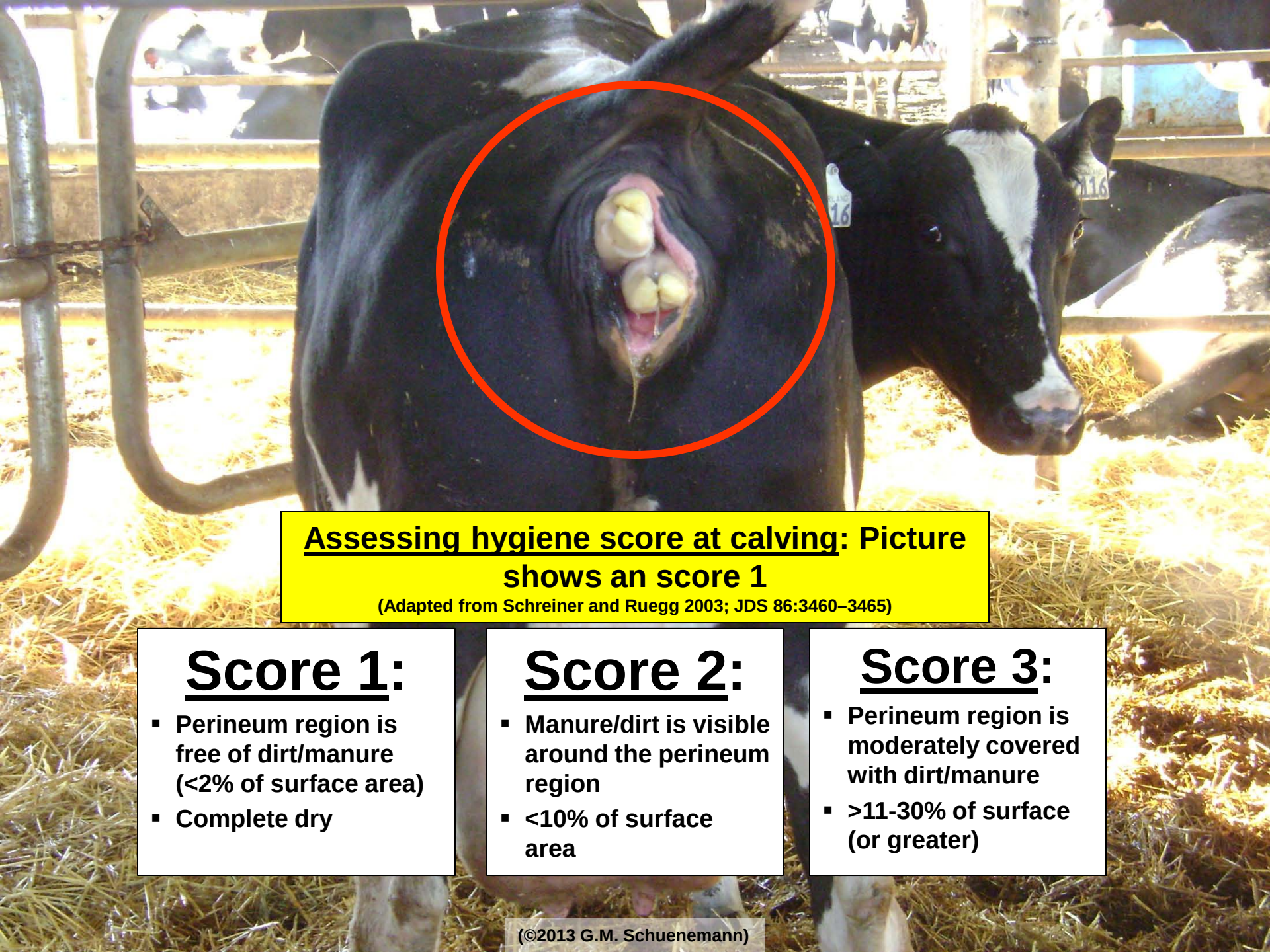
Link: http://www.drostproject.org/en_bovrep/guide.html

- **Visual guide of calving management**
- **Calving supplies**
- **Abnormal postures or presentations**
- **Calving injuries**
- **…**

Hygiene Practices

- Use clean, disposable, long sleeve gloves
- Wash the perineum with clean water and soap-disinfectant, repeat if cow defecates!
- Sanitize obstetric chains before and after each intervention or use

Most Transition Diseases are Associated with Excessive Negative Nutrient/Calcium Balance and Body Tissue Mobilization Prior to- or after Calving



Assessing hygiene score at calving: Picture shows an score 1

(Adapted from Schreiner and Ruegg 2003; JDS 86:3460–3465)

Score 1:

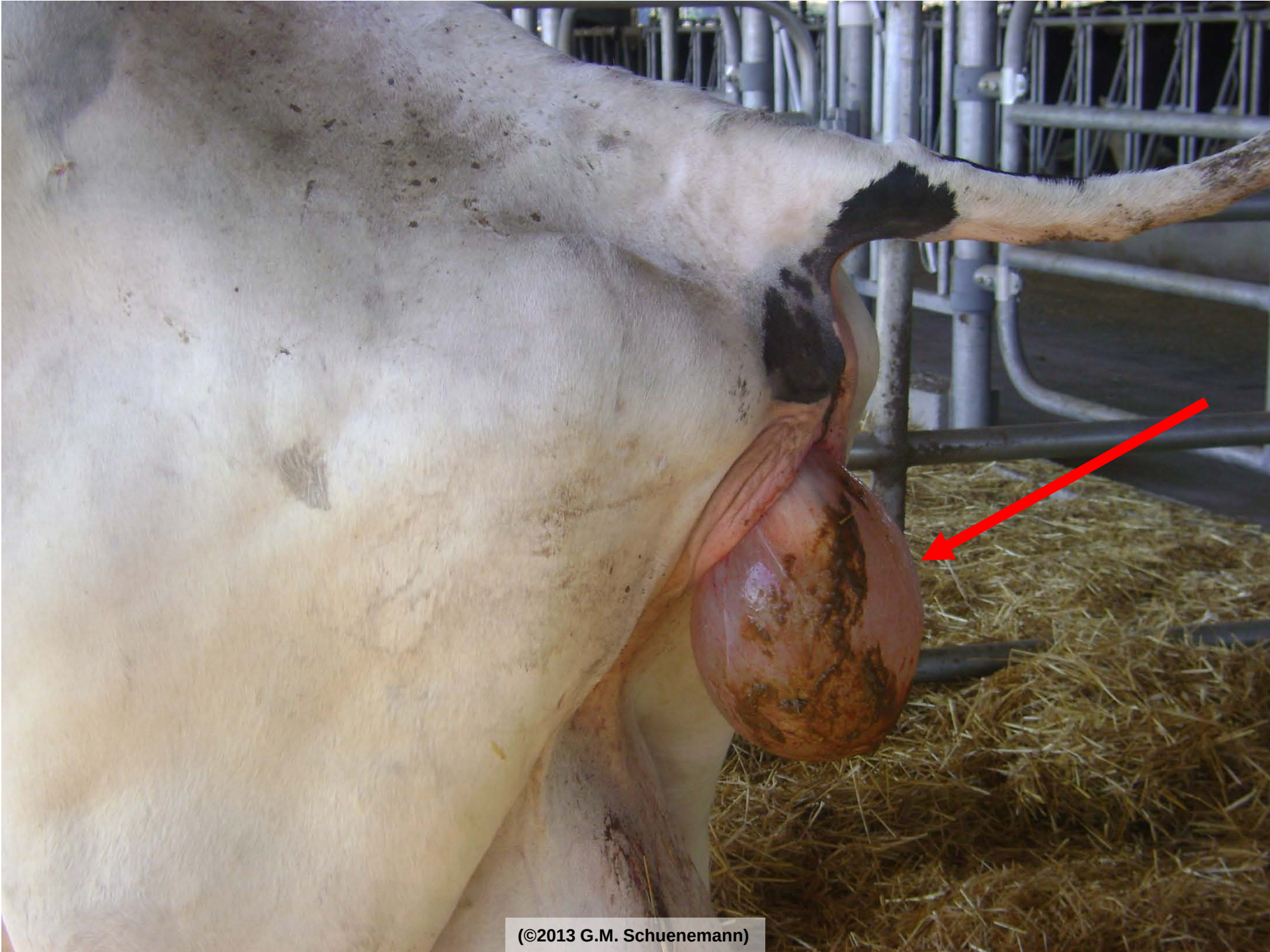
- Perineum region is free of dirt/manure (<2% of surface area)
- Complete dry

Score 2:

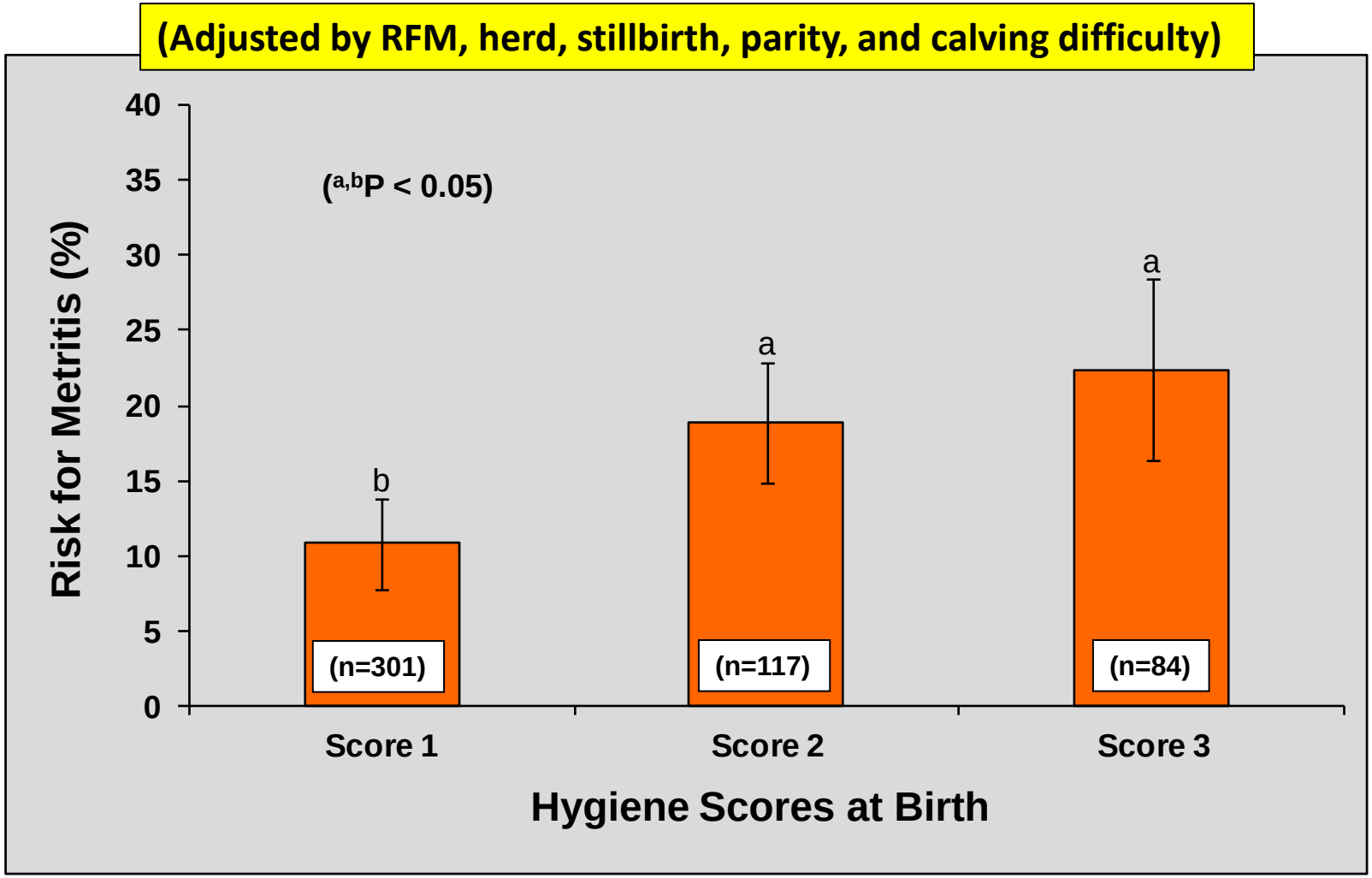
- Manure/dirt is visible around the perineum region
- <10% of surface area

Score 3:

- Perineum region is moderately covered with dirt/manure
- >11-30% of surface (or greater)


(©2013 G.M. Schuenemann)

Effect of Hygiene Scores on Metritis

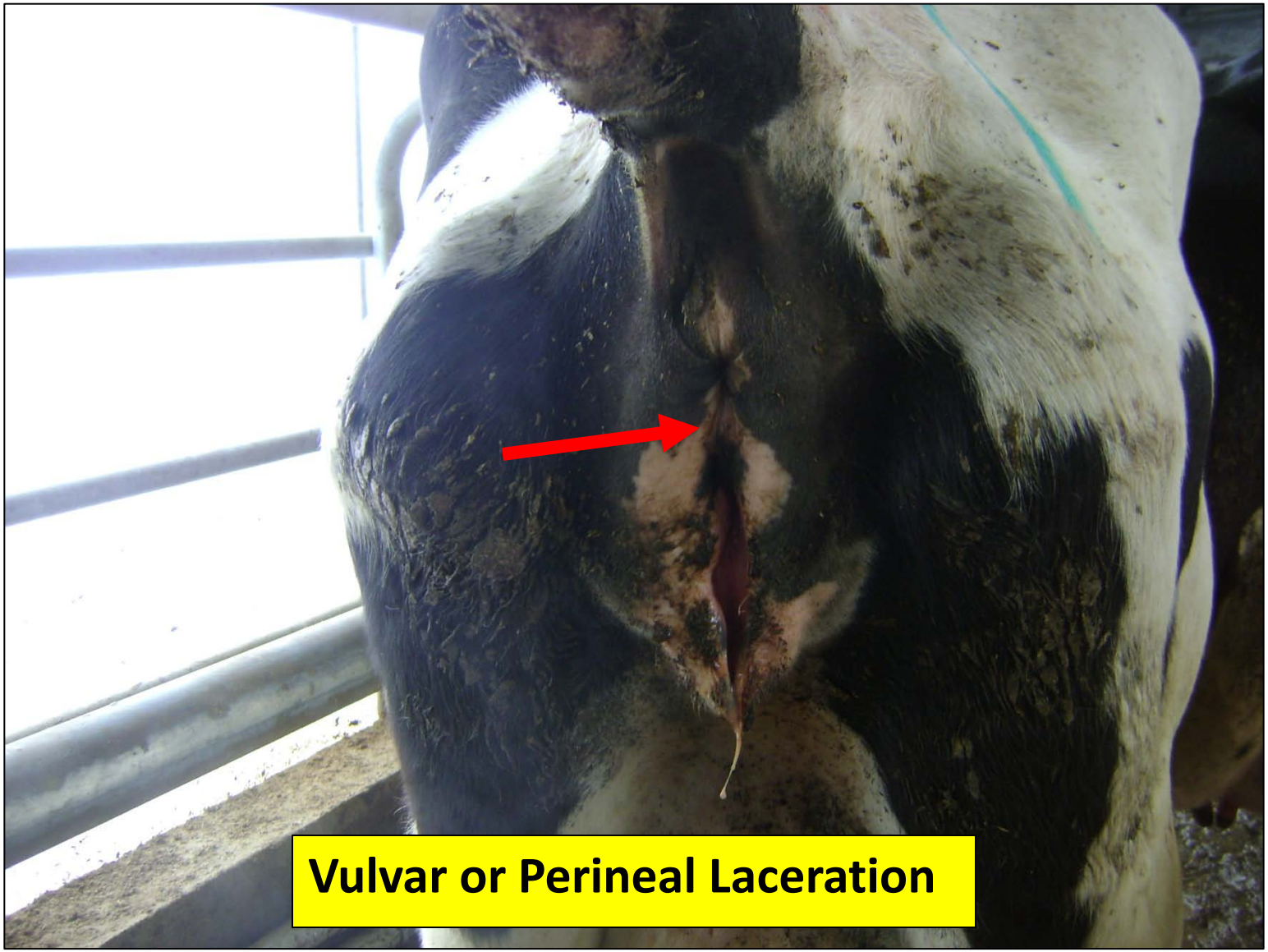


(Schuenemann et al., 2011b; JDS 94:744)

When Should I Call for Help?

- Establish guidelines in your SOP
- Normal progression occurs every 15-20 minutes
- If no progress within 1 hour after the appearance of the water bag, intervention is required!
- When abnormal posture is evident (e.g., appearance of one foot outside the vulva) immediately after “water bag” appearance, or for uterine torsions (where the water bag or feet do not appear outside the vulva), obstetric intervention is rendered
- If there is no progress within 30 minutes of intervention, call for help!

Calving-Related Injury



Assist the Newborn

- Make sure the calf is breathing
- Check cow for any additional calf (twins)
- Feed colostrum to the calf within 3 hours of birth
- When the cow is able to stand and walk, move her to the fresh pen

Cow sniffing the newborn calf immediately after birth

Proper Sanitation

- Remove placenta from the maternity pen
- For assisted births, wash and sanitize obstetric chains and bucket before and after each use
- See link to CFSPH below for selected desinfectants

Link to the Center for Food Security & Public Health at Iowa State University:
http://www.cfsph.iastate.edu/Infection_Control/disinfectant-resources-for-veterinarians.php

Link to the Center for Food Security & Public Health at Iowa State University:
http://www.cfsph.iastate.edu/Infection_Control/disinfectant-resources-for-veterinarians.php

Characteristics of Selected Disinfectants

For More Information, see the 'Disinfection 101' document at www.cfsph.iastate.edu

Disinfectant Category	Alcohols	Aldehydes	Biguanides	Halogens: Hypochlorites	Halogens: Iodine Compounds	Oxidizing Agents	Phenols	Quaternary Ammonium Compounds (QAC)
Sample Trade Names	Ethyl alcohol Isopropyl alcohol	Formaldehyde Glutaraldehyde	Chlorhexidine Nolvasan® Virosan®	Bleach	Betadyne® Providone®	Hydrogen peroxide Peracetic acid Virkon S® Oxy-Sept 333®	One-Stroke Environ® Pheno-Tek II® Tek-Trol®	Roccal® DiQuat® D-256®
Mechanism of Action	•Precipitates proteins •Denatures lipids	•Denatures proteins •Alkylates nucleic acids	•Alters membrane permeability	•Denatures proteins	•Denatures proteins	•Denature proteins and lipids	• Denatures proteins • Alters cell wall permeability	• Denatures proteins • Binds phospholipids of cell membrane
Advantages	•Fast acting •Leaves no residue	•Broad spectrum	•Broad spectrum	•Broad spectrum •Short contact time •Inexpensive	•Stable in storage •Relatively safe	•Broad spectrum	• Good efficacy with organic material • Non-corrosive • Stable in storage	• Stable in storage • Non-irritating to skin • Effective at high temperatures and high pH (9-10)
Disadvantages	•Rapid evaporation •Flammable	•Carcinogenic •Mucous membranes and tissue irritation •Only use in well ventilated areas	•Only functions in limited pH range (5–7) •Toxic to fish (environmental concern)	•Inactivated by sunlight •Requires frequent application •Corrodes metals •Mucous membrane and tissue irritation	•Inactivated by QACs •Requires frequent application •Corrosive •Stains clothes and treated surfaces	•Damaging to some metals	• Can cause skin and eye irritation	
Precautions	Flammable	Carcinogenic		Never mix with acids; toxic chlorine gas will be released			May be toxic to animals, especially cats and pigs	
Vegetative Bacteria	Effective	Effective	Effective	Effective	Effective	Effective	Effective	YES—Gram Positive Limited—Gram Negative
Mycobacteria	Effective	Effective	Variable	Effective	Limited	Effective	Variable	Variable
Enveloped Viruses	Effective	Effective	Limited	Effective	Effective	Effective	Effective	Variable
Non-enveloped Viruses	Variable	Effective	Limited	Effective	Limited	Effective	Variable	Not Effective
Spores	Not Effective	Effective	Not Effective	Variable	Limited	Variable	Not Effective	Not Effective
Fungi	Effective	Effective	Limited	Effective	Effective	Variable	Variable	Variable
Efficacy with Organic Matter	Reduced	Reduced	?	Rapidly reduced	Rapidly reduced	Variable	Effective	Inactivated
Efficacy with Hard Water	?	Reduced	?	Effective	?	?	Effective	Inactivated
Efficacy with Soap/ Detergents	?	Reduced	Inactivated	Inactivated	Effective	?	Effective	Inactivated

? Information not found

Disclaimer: The use of trade names does not in any way signify endorsement of a particular product. For additional product names, please consult the most recent Compendium of Veterinary Products.

References: Linton AH, Hugo WB, Russel AD. Disinfection in Veterinary and Farm Practice. 1987. Blackwell Scientific Publications; Oxford, England; Quinn PJ, Markey BK. Disinfection and Disease Prevention in Veterinary Medicine, In: Block SS, ed., Disinfection, Sterilization and Preservation. 5th edition. 2001. Lippincott, Williams and Wilkins: Philadelphia.

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Serum Ca^{2+} within 48 h after Calving

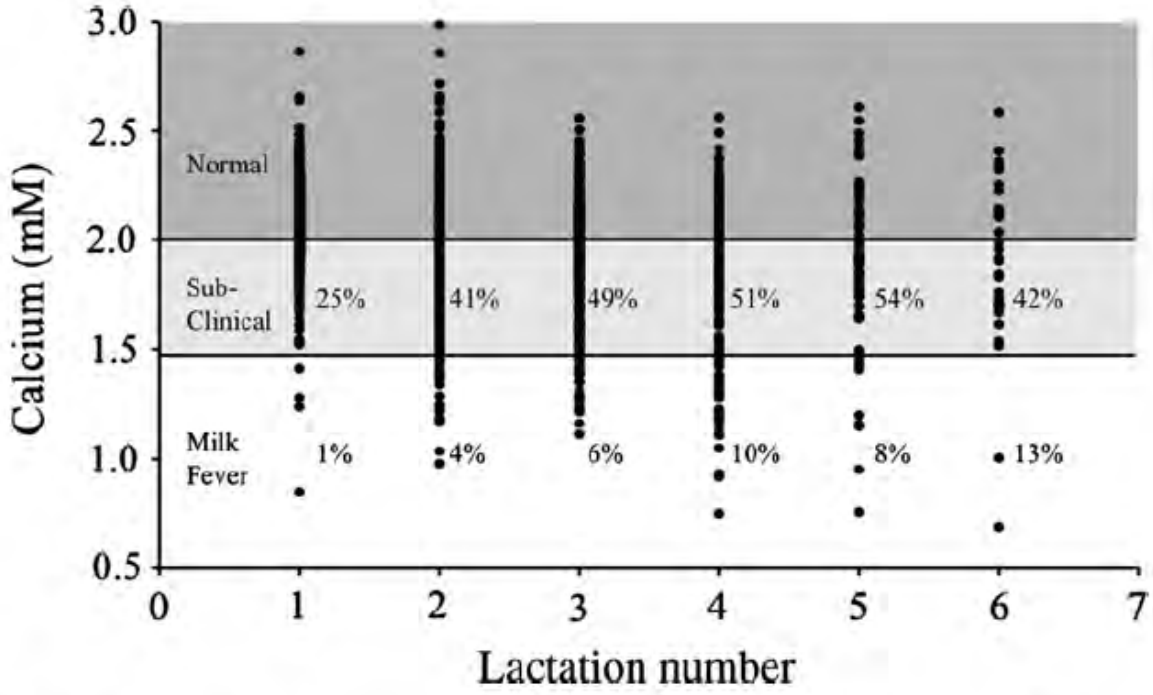


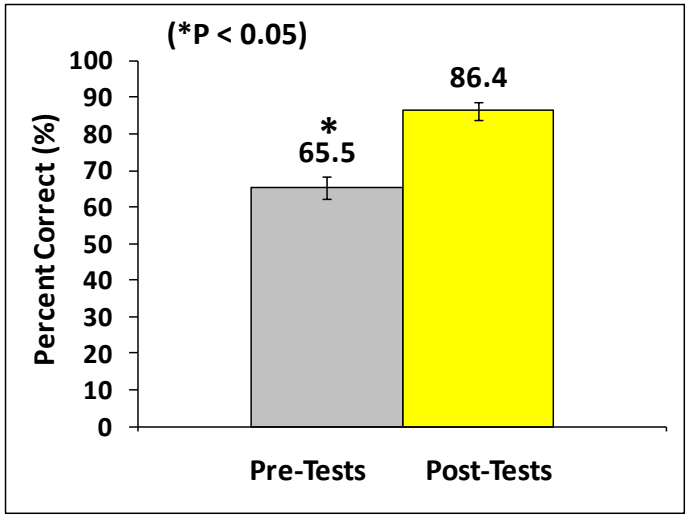
Fig. 1. Serum calcium concentrations were plotted for 1462 cows. All serum samples were collected within 48 h postpartum by lactation number: 1st lactation cows ($n = 454$), 2nd lactation cows ($n = 447$), 3rd lactation cows ($n = 291$), 4th lactation cows ($n = 166$), 5th lactation cows ($n = 72$), and 6th lactation cows ($n = 32$). The percent of cows by lactation number that experienced a clinical milk fever episode which was treated or were subclinically hypocalcemic are shown in the graph.

(Adapted from Reinhardt et al., 2011; Veterinary J. 188:122–124)

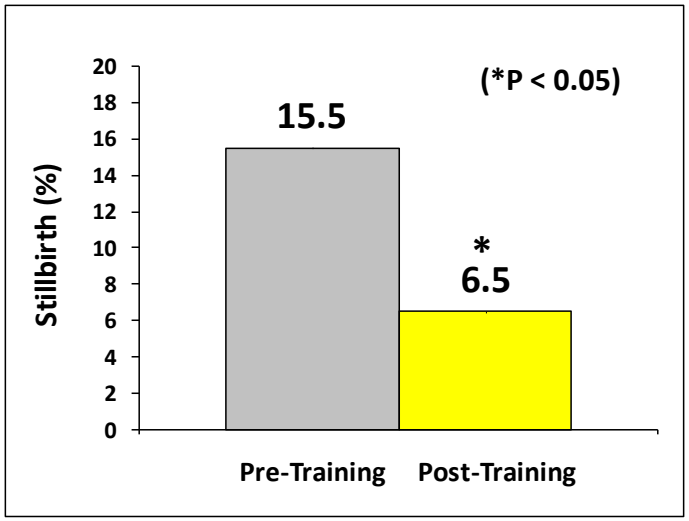
Prevention of Stillbirth

- **At national level:**
  - Selection program for sires with calving ease genetics
- **At herd level:**
  - Training of calving personnel & establish SOPs
  - Facilities & prevent hypocalcemia prepartum
  - Close monitoring of first-calf heifers
  - Calves born in backward presentations
  - Communication at the time of shift change of personnel
  - Length of time in dry pen
  - Use of sires with calving ease genetics
  - …

Effect of Calving Training to Dairy Personnel on Stillbirth?



(Schuenemann et al., 2013)



Additional Considerations

- Early intervention has the potential to prevent stillbirth, but also has the potential for dam injury due to lack of soft tissue dilation
- For backward presentations, help finish birth!
- For first-calf heifers, once the nose/feet of the calf are outside the vulva, help finish the birth!
- Calving protocols/data should be reviewed and adjusted (if necessary) at least twice a year
- Make sure your calving personnel know what to look for/monitor before and during calving and why it is important

Personnel Feedback on Calving Management Practices

J. Dairy Sci. 96:2671–2680
http://dx.doi.org/10.3168/jds.2012-5976

Dairy calving management: Description and assessment of a training program for dairy personnel

G. M. Schuenemann,[1] S. Bas, E. Gordon, and J. D. Workman
Department of Veterinary Preventive Medicine, The Ohio State University, Columbus 43210

ABSTRACT

Key words: dairy personnel, calving management,

- **Importance of open communication within the farm team (e.g., between workers at the time of work shift and when to call for help)**
- **Need for new or additional obstetric chains to assist difficult births**
- **Need for additional help to be able to assist severe or multiple cows experiencing dystocia at the same time**
- **Importance of having established and written calving protocols (e.g., hygiene practices, what to look for, why it is important, and when it is appropriate to intervene)**
- **Animals with unknown anticipated calving dates (e.g., missing records or bull bred first-calf heifers)**
- **Use of defined events for record-keeping (e.g., scale used for ease of calving, stillbirth, retained fetal membranes)**
- **Proper maintenance of calving or maternity pen (e.g., broken water hose or gate)**

Record-Keeping

Dairy:													
MATERNITY - CALVING													
COW_ID	**PEN**	**DATE**	**BCS**	**TIME STARTED**	**TIME BIRTH**	**ALIVE/DEAD**	**SEX**	**DIFFICULTY**	**PHS**	**STILLBIRTH**	**CALF_ID**	**COMMENTS**	**INITIALS**
4420	10	4/22/2013	3.75	2:00 pm	3:25 pm	A	M	1 2 3 4	1 2 3	NO	1000		GMS
1987	10	4/25/2013	3	6:15 am	9:00 am	D	M	1 2 3 4	1 2 3	YES		TWIN	GMS
1987	10	4/25/2013	3	6:15 am	9:00 am	A	M	1 2 3 4	1 2 3	NO	1001	TWIN	GMS
								1 2 3 4	1 2 3				
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								1 2 3 4	1 2 3				

(PHS = Perineum hygiene score (1-3 scale) at calving; BCS = Body condition scored immediately after calving; A = Alive; D = Dead; F = Female; M = Male)

Degree of Assistance at Calving

Scale	Description of Dystocia(*)	References
1 to 3 scale	1 = no assistance 2 = slight assistance 3 = needed assistance	Meyer et al., 2001
1 to 5 scale	1 = no assistance 2 = assistance by one person without the use of mechanical traction 3 = assistance by 2 or more people 4 = assistance with mechanical traction 5 = surgical procedure	Dematawewa and Berger, 1997 Lombard et al., 2007 Schuenemann et al., 2011a
Combination of both	Description is based on calving difficulty	Mangurkar et al., 1984 Schuenemann et al., 2011a

(*)Description of scales used to determine the degree of dystocia according to the degree of assistance provided during parturition in Holstein herds.

Acknowledgements

- SARE-NCR Professional Development Program (ENC10-120)
- Graduate and undergraduate students
- Collaborating dairy farms
- Practicing veterinarians

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