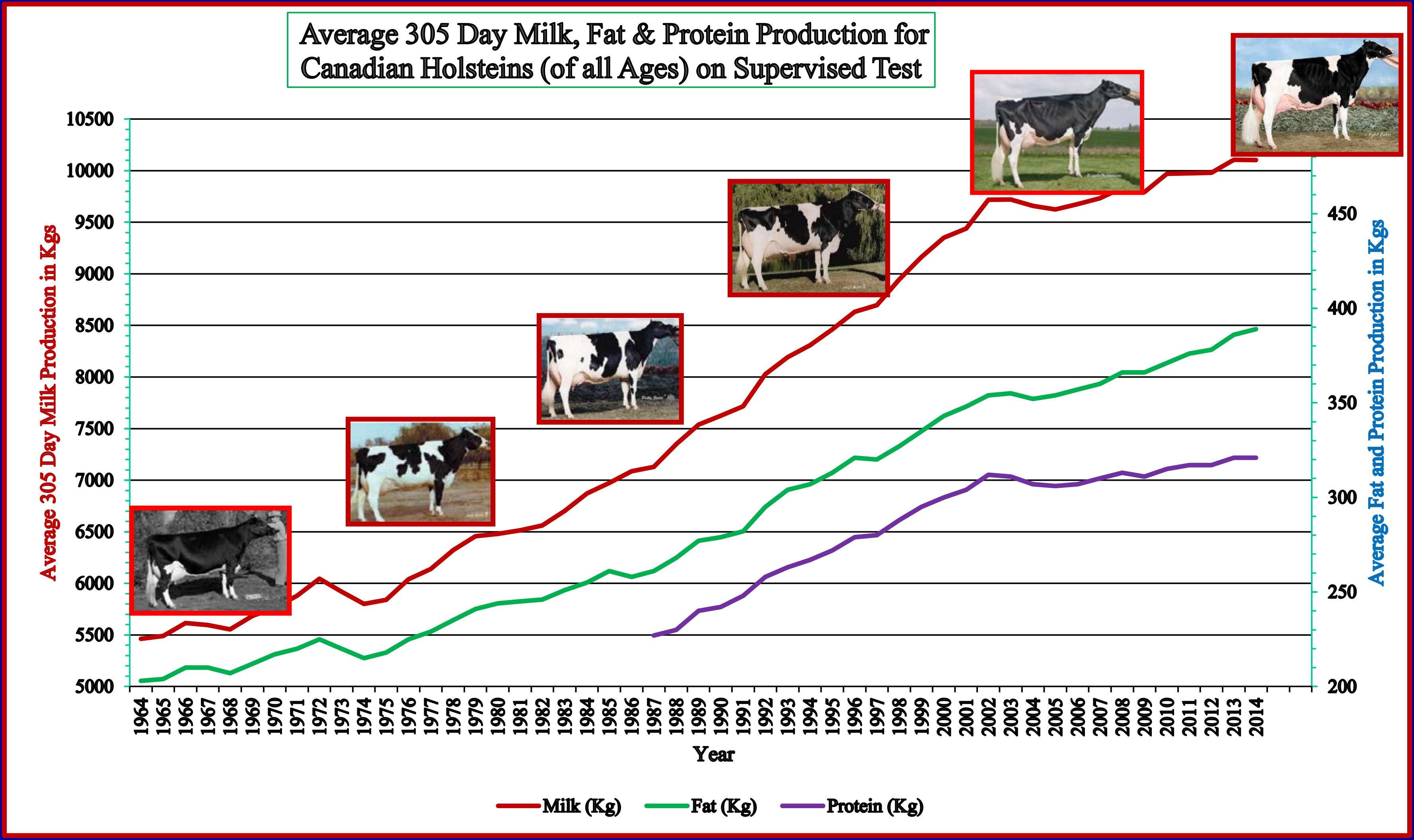
The Importance of Rump, Loin, and Body Capacity in Achieving Desirable *Strength and Longevity*

Functional Conformation Conference

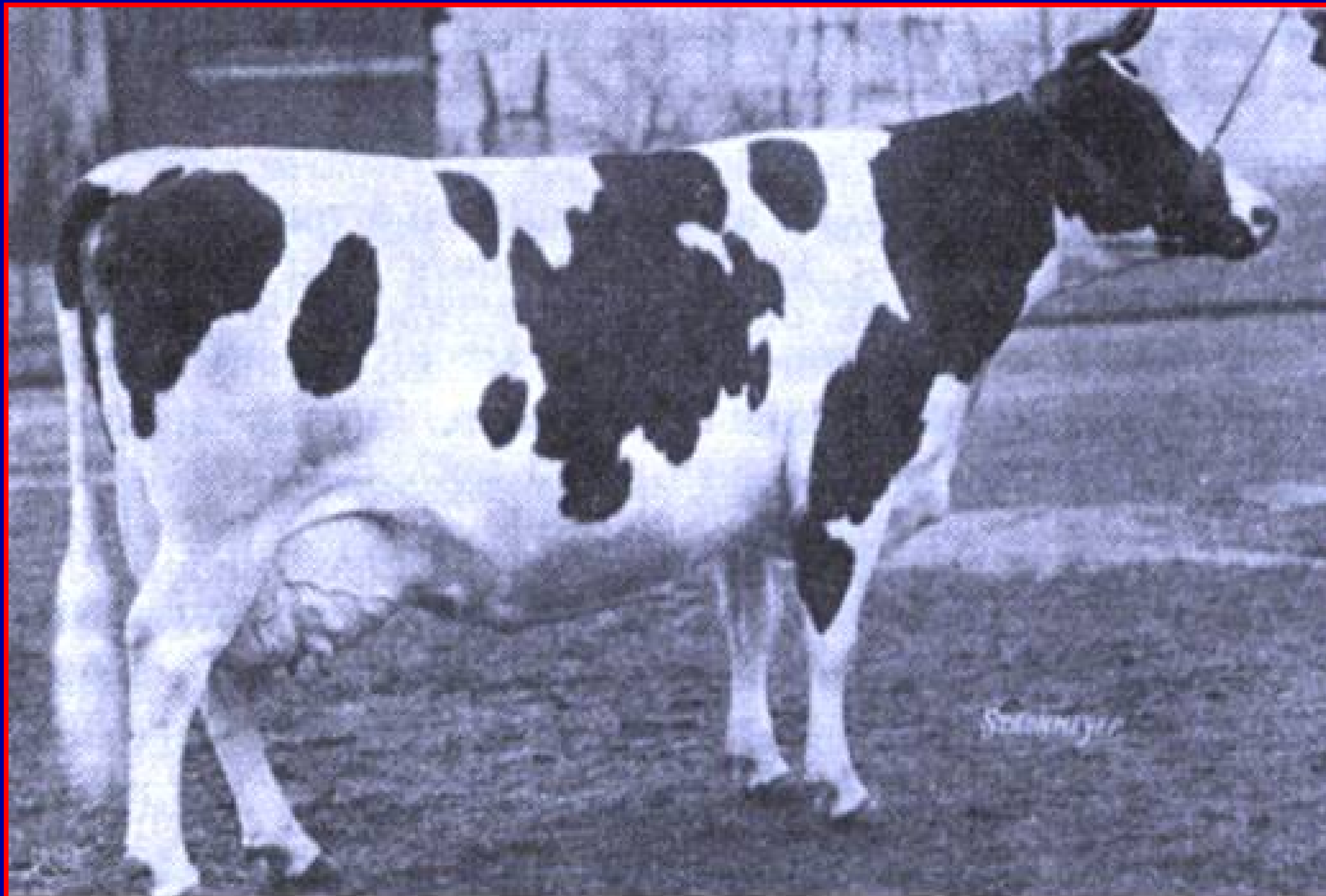
Gothenburg, Sweden

Dr. Gordon Atkins – Feb 6 - 7, 2020



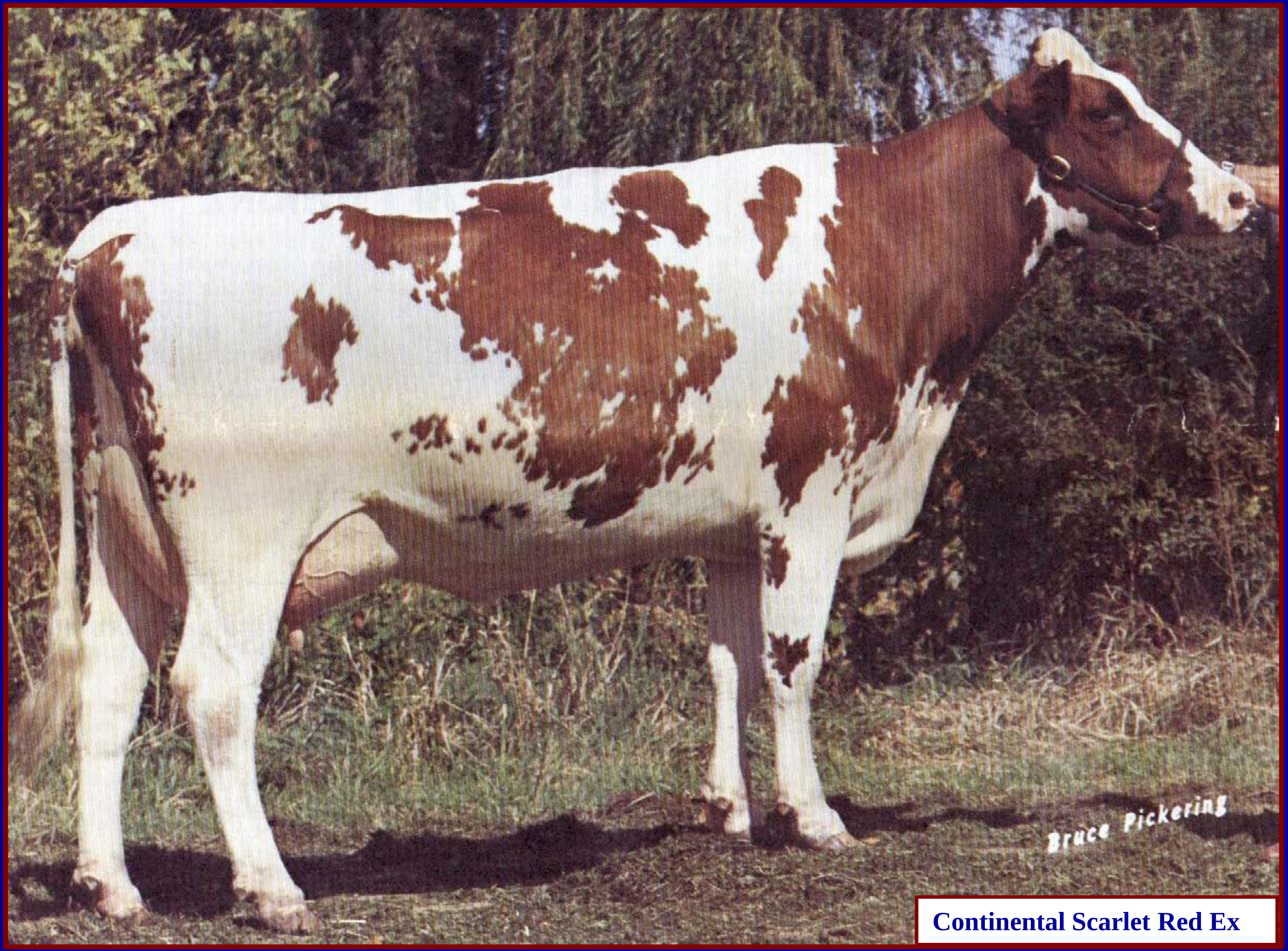
Data Source – Agriculture and Agri-Food Canada

1906 Grand Champion @ U.S. National Show



1933 Royal Grand Champion

Grand Champion Royal Winter Fair 1957-58-59

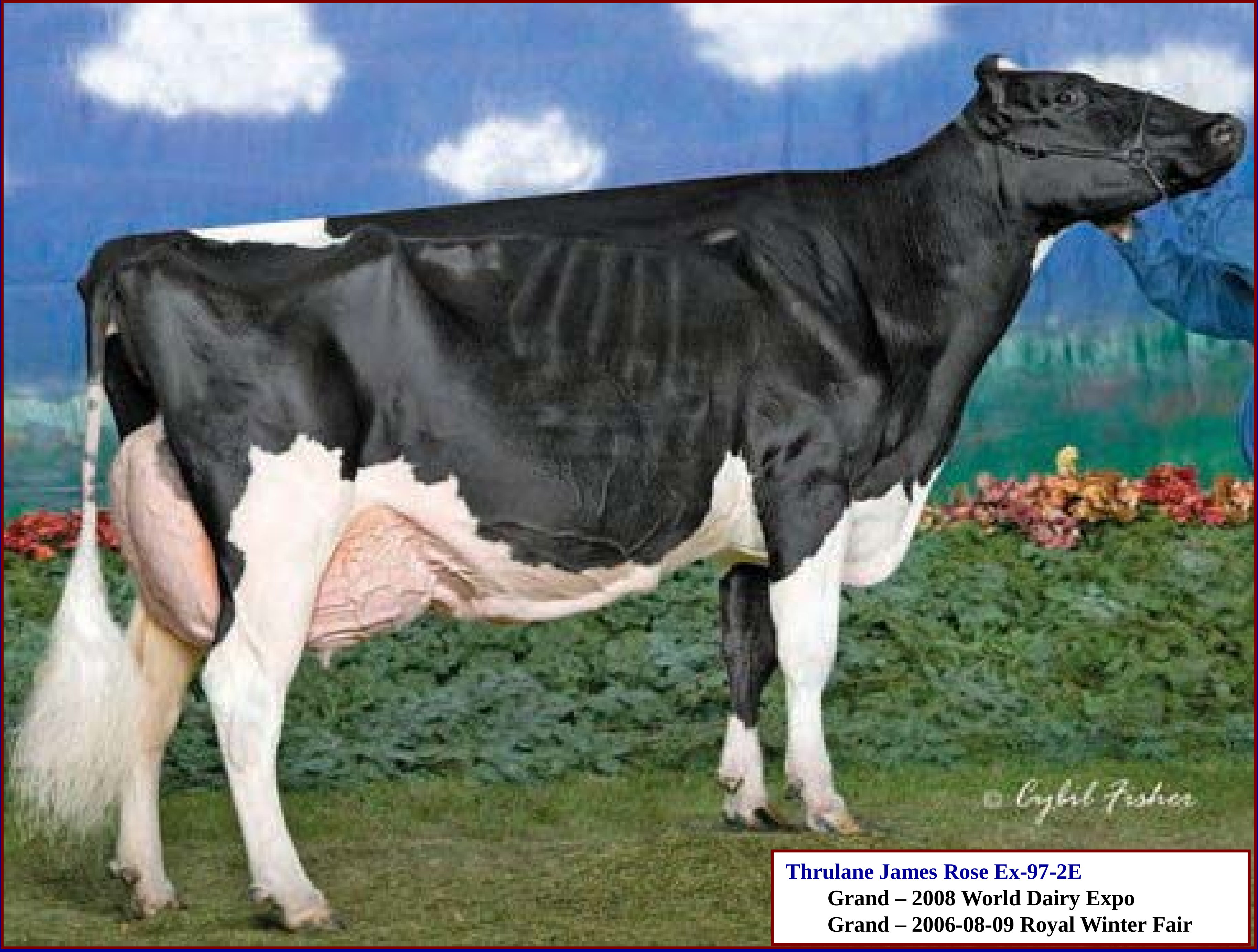


1982 Royal Grand Champion

Brookview Tony Charity Ex

Grand Champion Royal Winter Fair 1983-85-86-87

Grand Champion Royal Winter Fair 1997-98-99



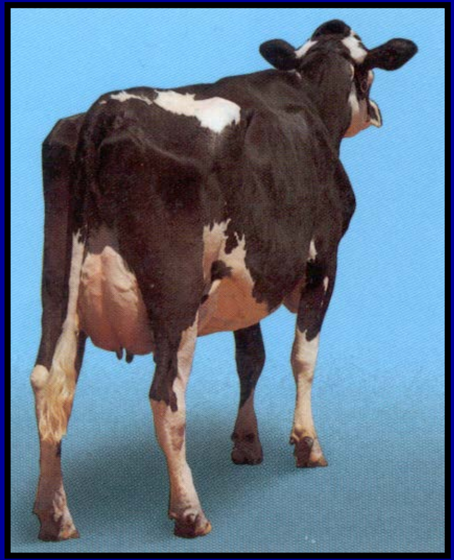
Thrulane James Rose Ex-97-2E

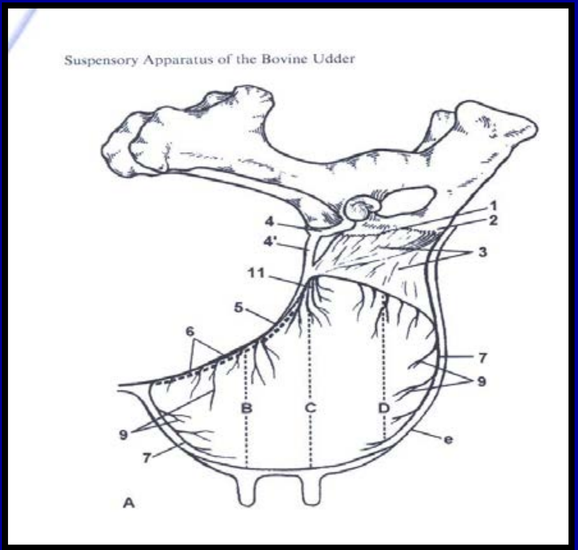
Grand – 2008 World Dairy Expo

Grand – 2006-08-09 Royal Winter Fair

RF Goldwyn Hailey Ex-97-2E
Supreme – 2012 World Dairy Expo
Grand – 2012, 2014 Royal Winter Fair

Rump and Loin Structure

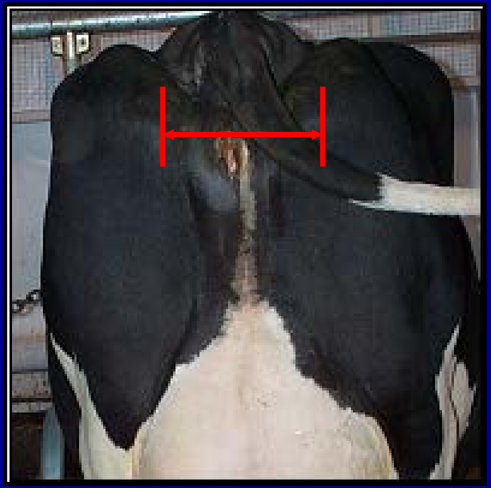




- Support structure for udder, body wall, & hind legs
- Wide, well-sloped, & strongly attached to loin
- Rump slope impacts position of reproductive tract
- Facilitates improved calving ease & tract drainage
- Facilitates ease of insemination & embryo transfer

Rump (12%)

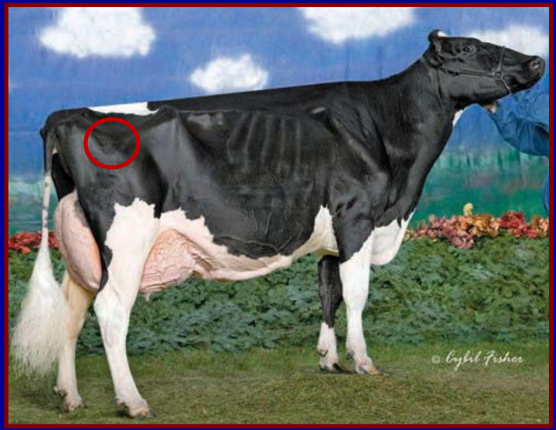
Pin Width (21%)



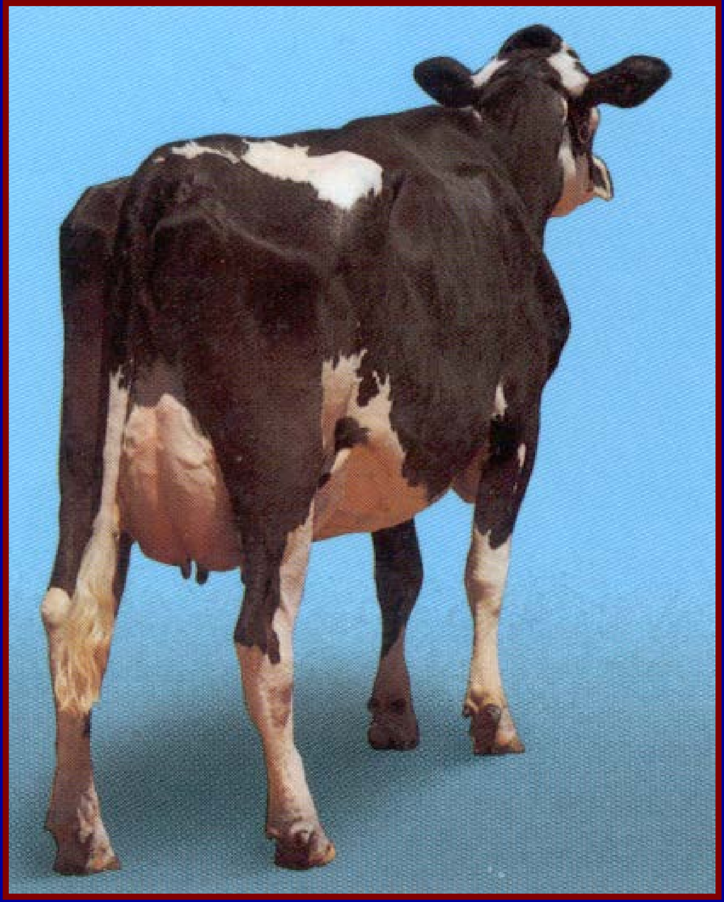
Rump Angle (23%)

Loin Strength (32%)

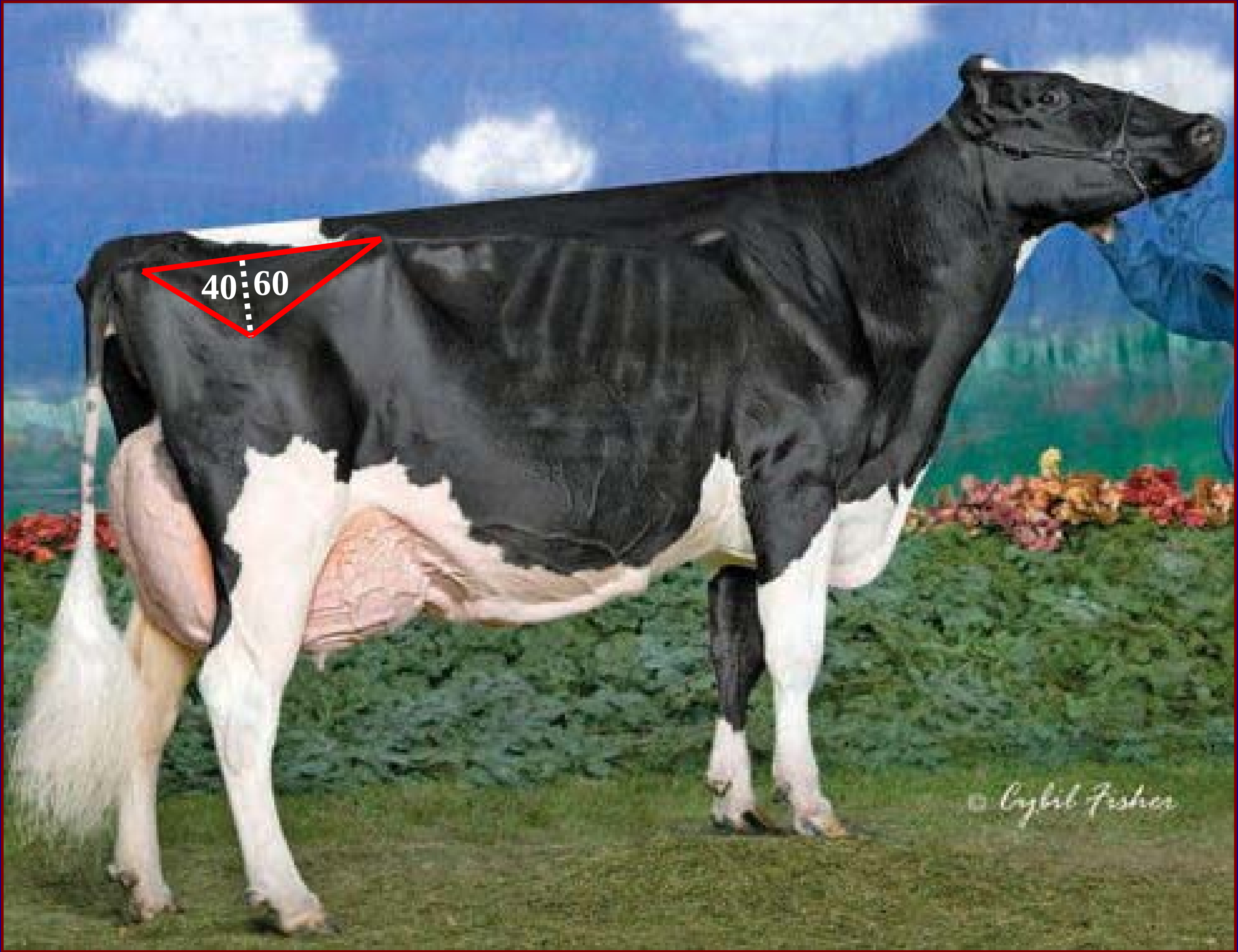
Thurl Placement (24%)



Rump and Loin Structure



Thurl Placement & Pin Width


40
60
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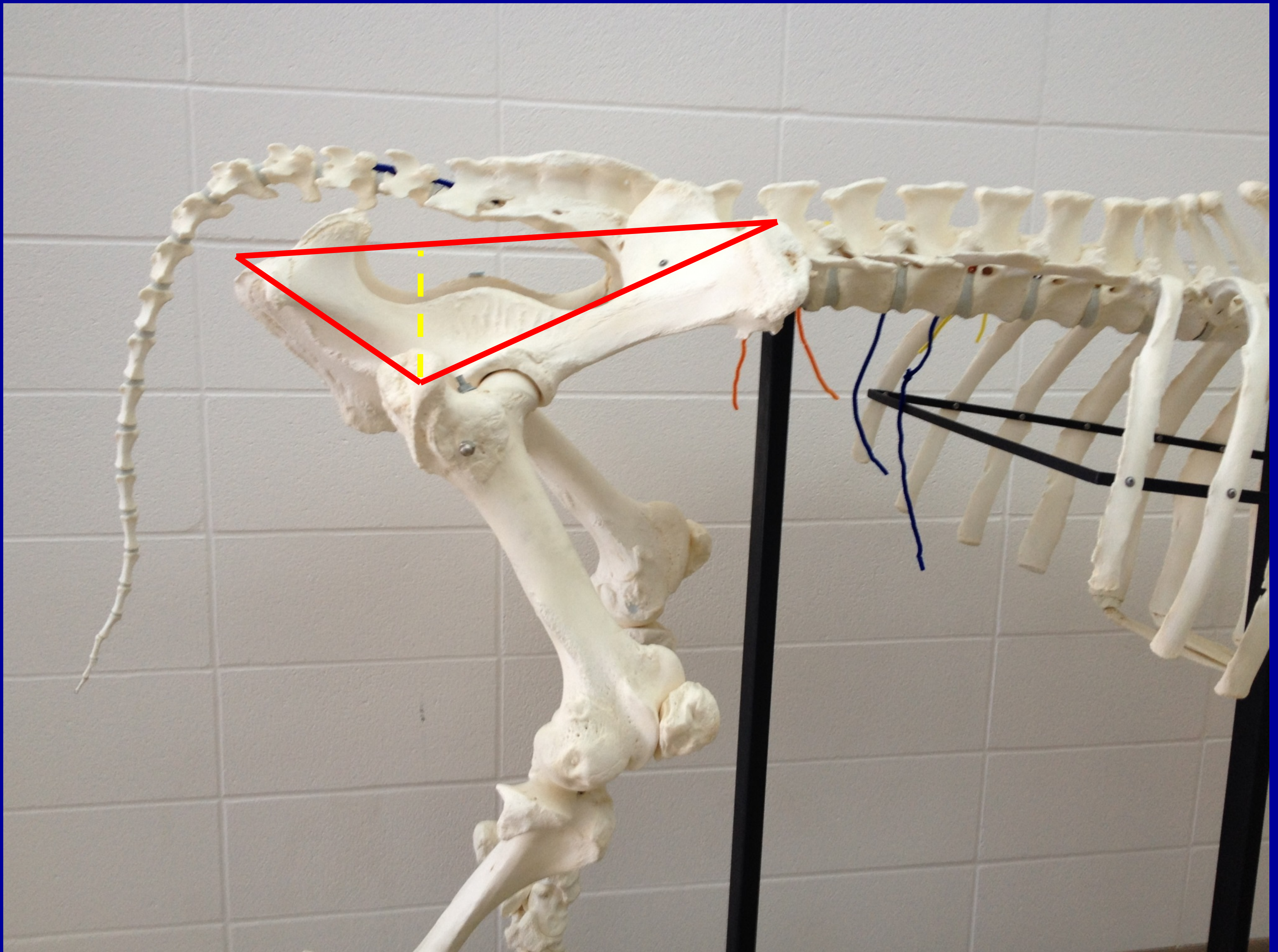
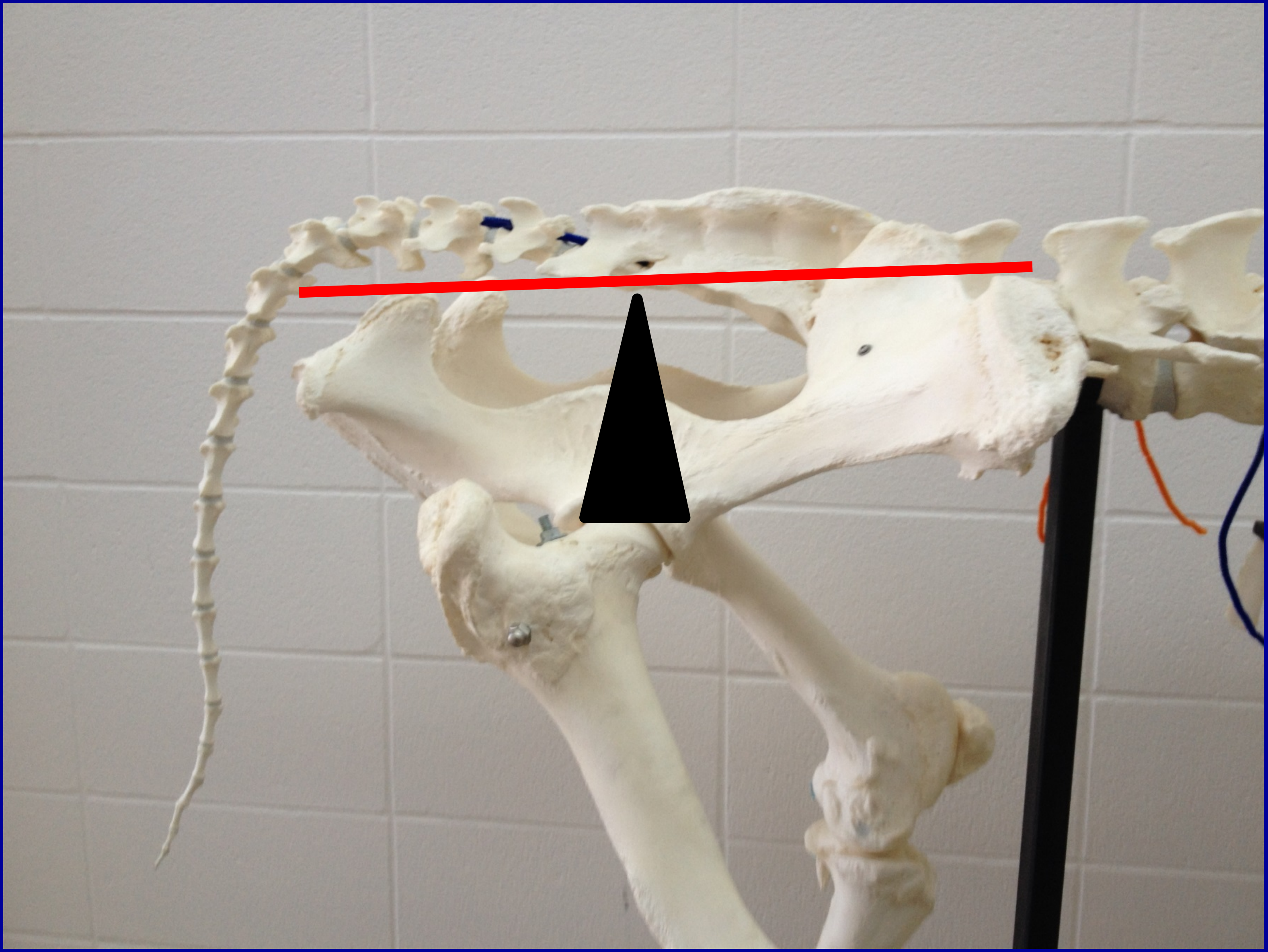
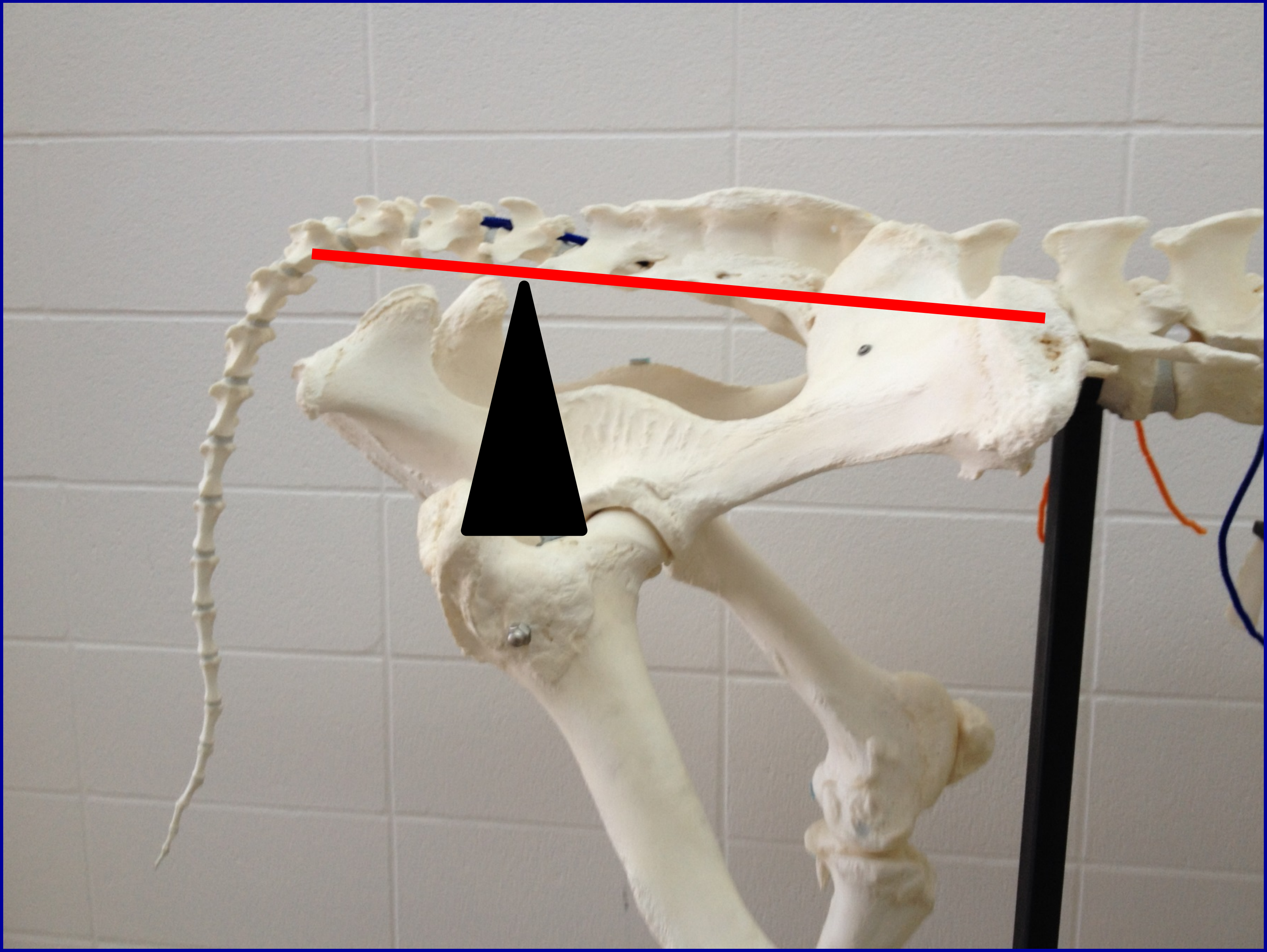
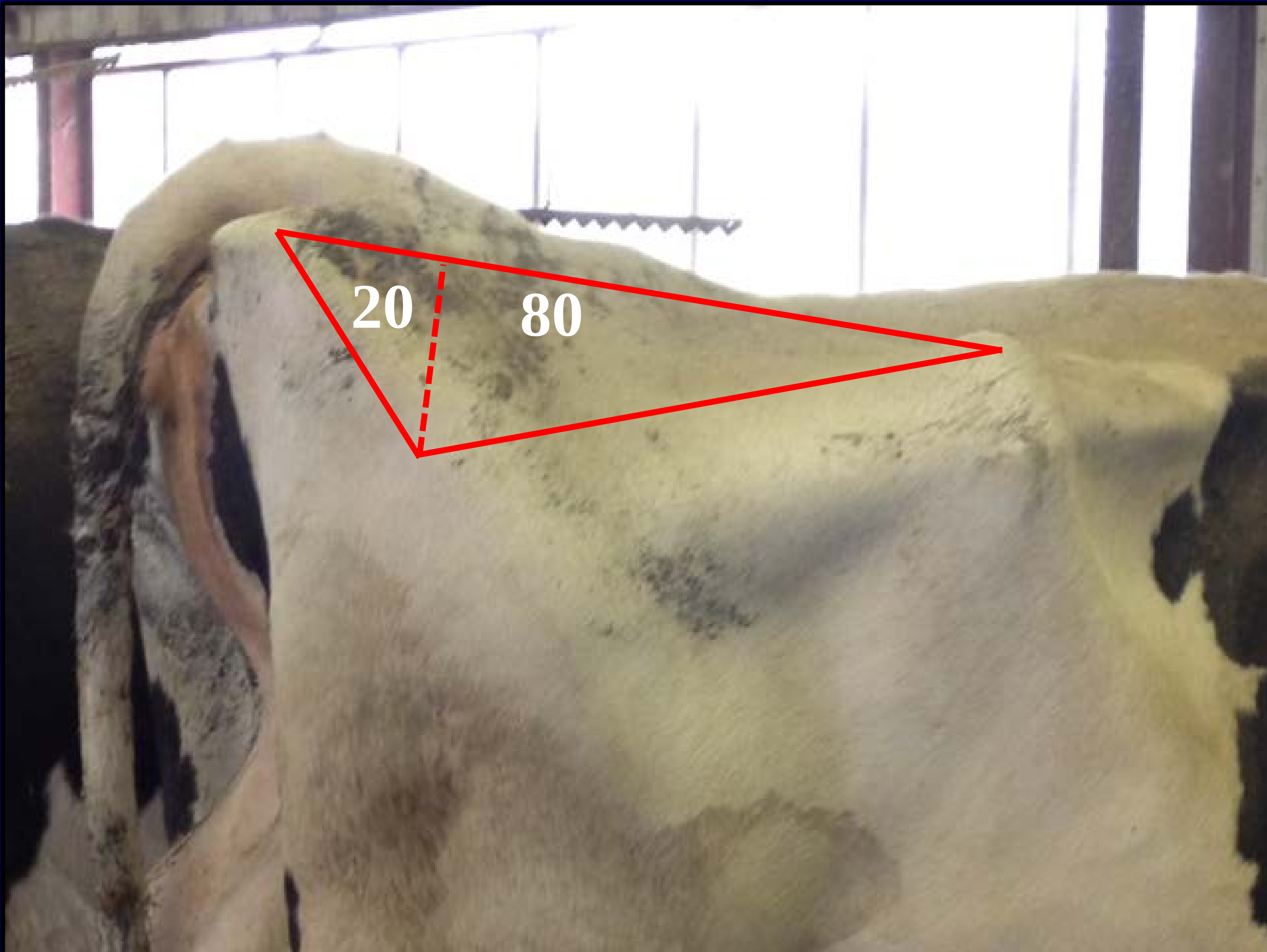


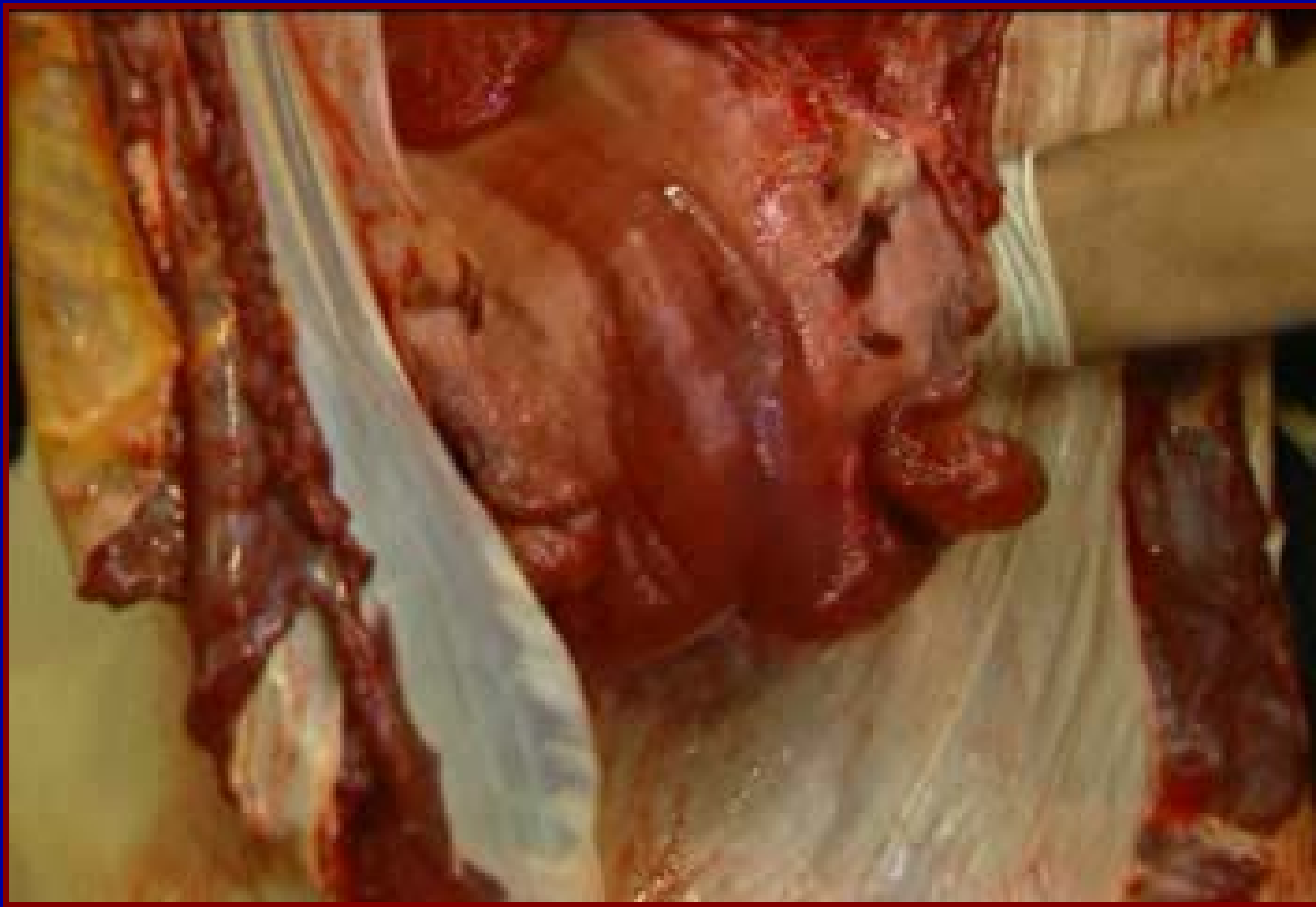
Thurl Placement (9%)

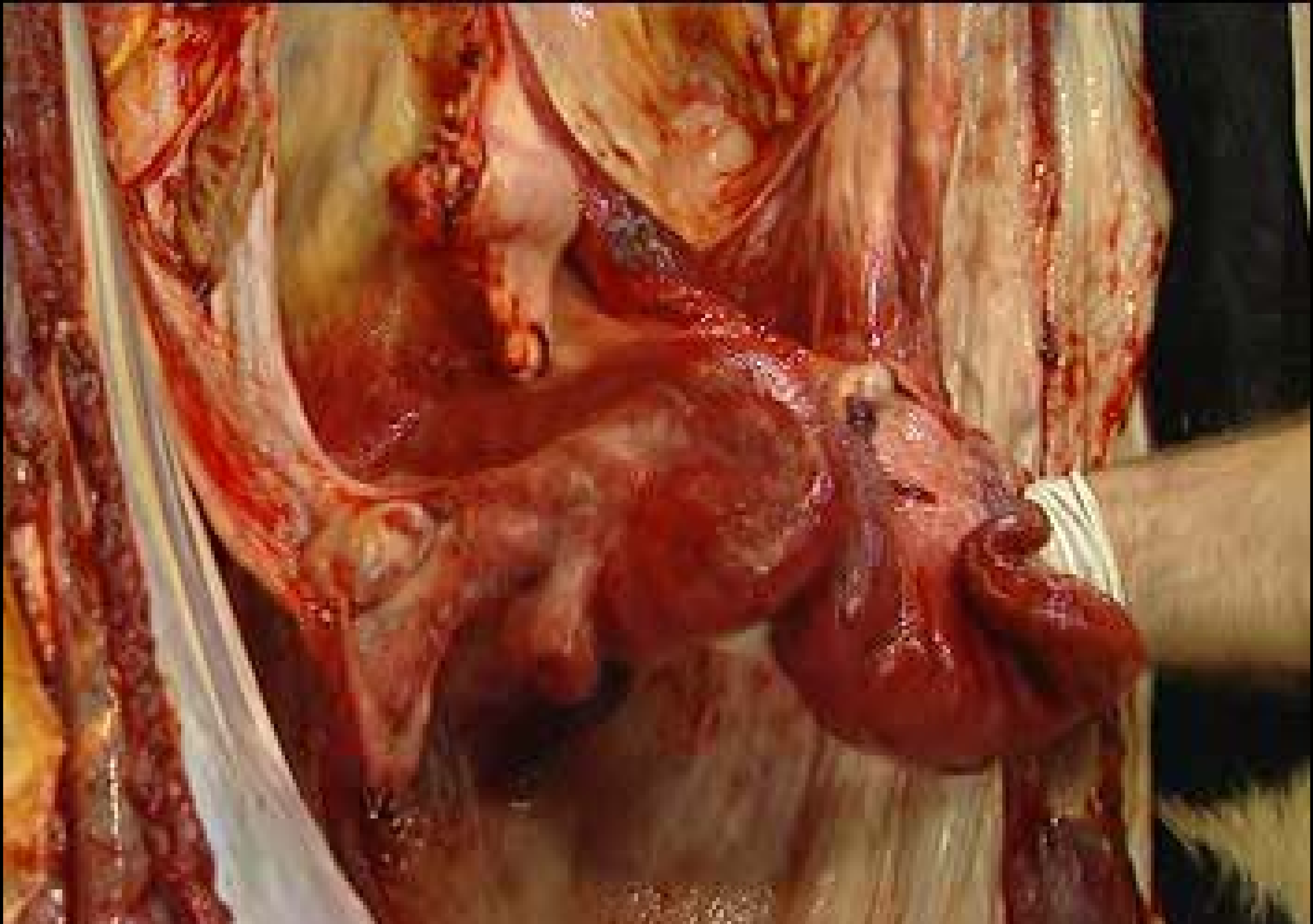


Thurl Placement




20
80





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Short communication: A reproductive tract scoring system to manage fertility in lactating dairy cows

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ABSTRACT

We developed a reproductive tract size and position score (SPS) system as a reproductive management tool to identify lactating dairy cows with decreased fertility. This system, relying solely on transrectal palpation, considers the size (cervical and uterine) and position of the reproductive tract relative to the pelvis. Cows undergoing pre-breeding exams were identified as having reproductive tracts that were small (SPS1), medium (SPS2), or large (SPS3). Cows designated SPS1 had small and compact uterine horns that rested within the pelvic cavity; SPS2 cows had reproductive tracts that were intermediate in cervical and uterine horn diameter, with longer uterine horns resting partially outside the pelvic cavity; and SPS3 cows had reproductive tracts that were larger and rested mostly outside the pelvic cavity. Cows that were SPS1 had a higher rate of pregnancy per artificial insemination (43.3 ± 3.7%) than cows that were SPS2 (36.9 ± 3.6%) or SPS3 (27.7 ± 4.3%). The percentage of cows with an SPS2 score differed in pregnancies per artificial insemination compared with SPS3 cows. The average days in milk was similar for SPS1, SPS2, and SPS3 cows (104.3 ± 3.5, 98.4 ± 3.4, and 94.7 ± 7.7, respectively). Ultrasound measurements of the uterine horn and cervical diameter, and length measurements of the uterine horns, cervix, and vagina confirmed differences among the SPS groups derived by transrectal palpation. The ease with which transrectal palpation can be used to determine the size and position of the reproductive tract attests to the relevance and usefulness of this scoring system to identify less fertile lactating dairy cows. The ability to do so with ease provides an opportunity to make economically relevant management decisions and maximize reproductive efficiency in a given herd.

Key words: reproductive tract size-position score, fertility, dairy cow, parity

Short Communication

Conception rates of lactating Holstein cows in the early 1980s averaged 50.8, 48.9, and 48.3% for cows in their first, second, and third parity, respectively (Gwazdauskas et al., 1981). From 1996 to 2006, conception rates of lactating Holstein cows ranged from 33 to 30%, with a low of 27% reported in 2001 (Norman et al., 2009). Although slight improvements have been noticed since 2002, attributed to increased use of estrus-ovulation synchronization protocols and better genetic selection (Norman et al., 2009; Binelli et al., 2014), additional efforts are needed to improve the reproductive performance of today's lactating dairy cows.

General evaluations of the female reproductive tract, including the diameter and tone of the uterine horns and the ovarian structures, have been used as predictors of fertility in beef (Andersen et al., 1991; Holm et al., 2009; Gutierrez et al., 2014) and dairy heifers (Stevenson et al., 2008). Relying on ultrasonography, Baez et al. (2016) reported a negative association between uterine size and fertility in lactating dairy cows. The objective of our study was to develop a reproductive tract size and position score (**SPS**) system that could be used as a reproductive management tool to identify lactating dairy cows with decreased fertility. To maximize implementation potential, we focused our efforts on developing a system that relied on transrectal palpation to determine the size and position of the reproductive tract relative to the pelvis. We hypothesized that pregnancy per AI would be higher in cows with smaller reproductive tracts that rested within the pelvic cavity.

We obtained institutional animal care and use approval before beginning this study. In our first study, 100 nonpregnant lactating Holstein cows (>30 DIM, corn-silage-based TMR diet) from a single herd were palpated per rectum and assigned an SPS score as de-

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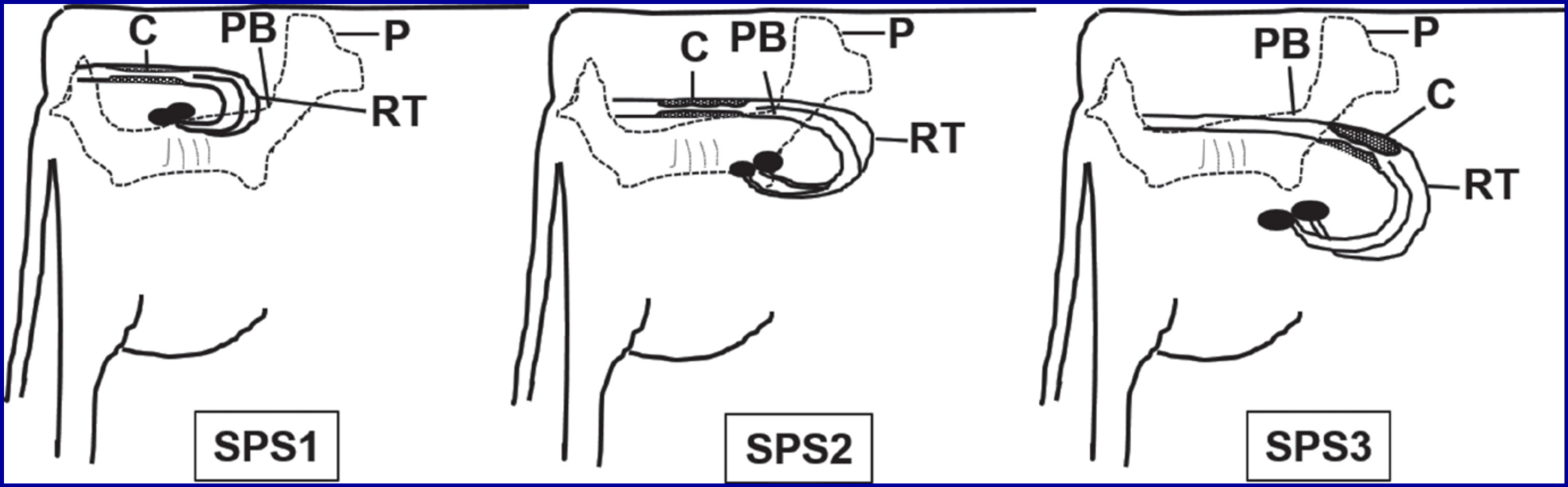
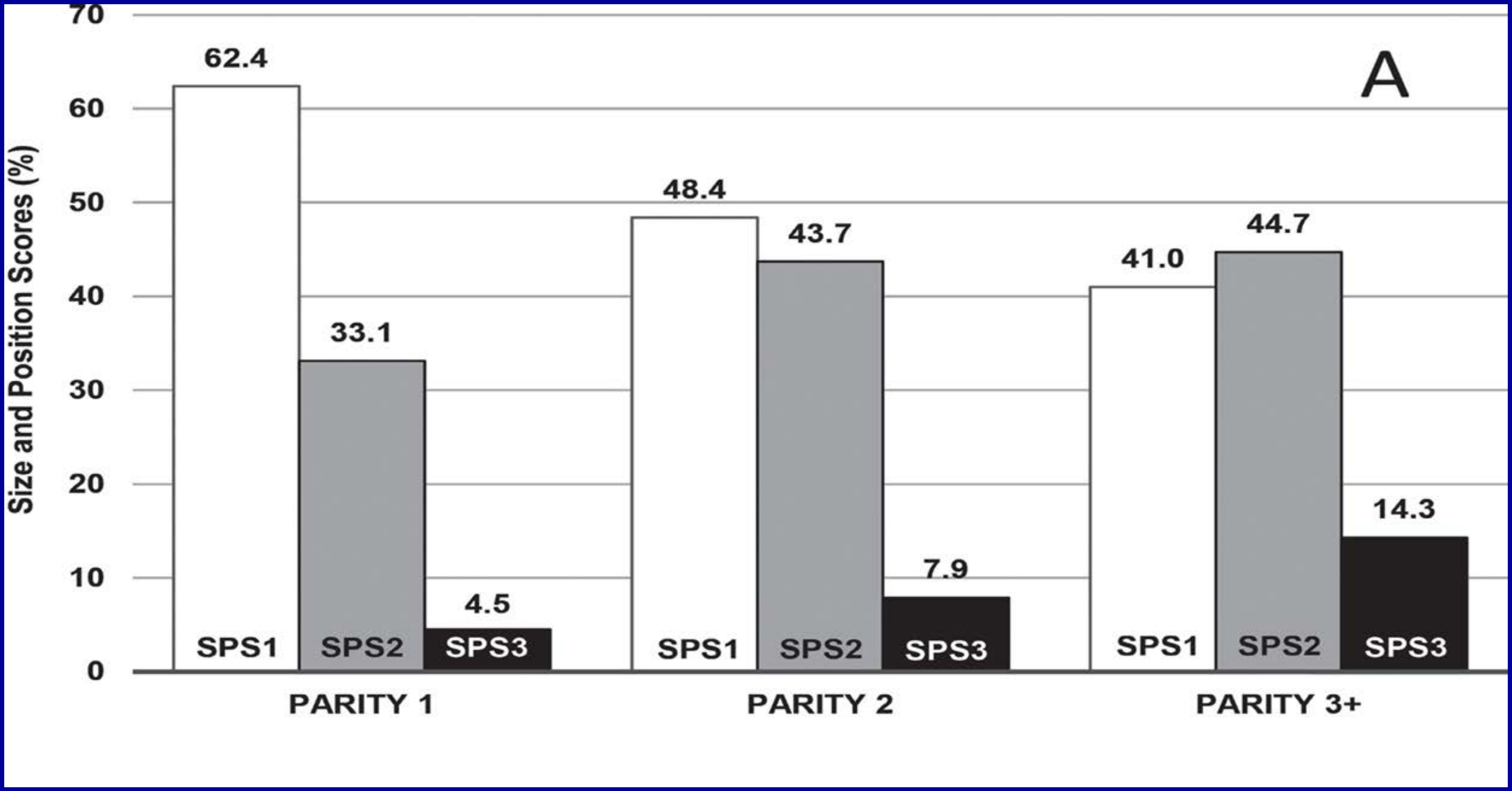
Size and Position of the Reproductive Tract

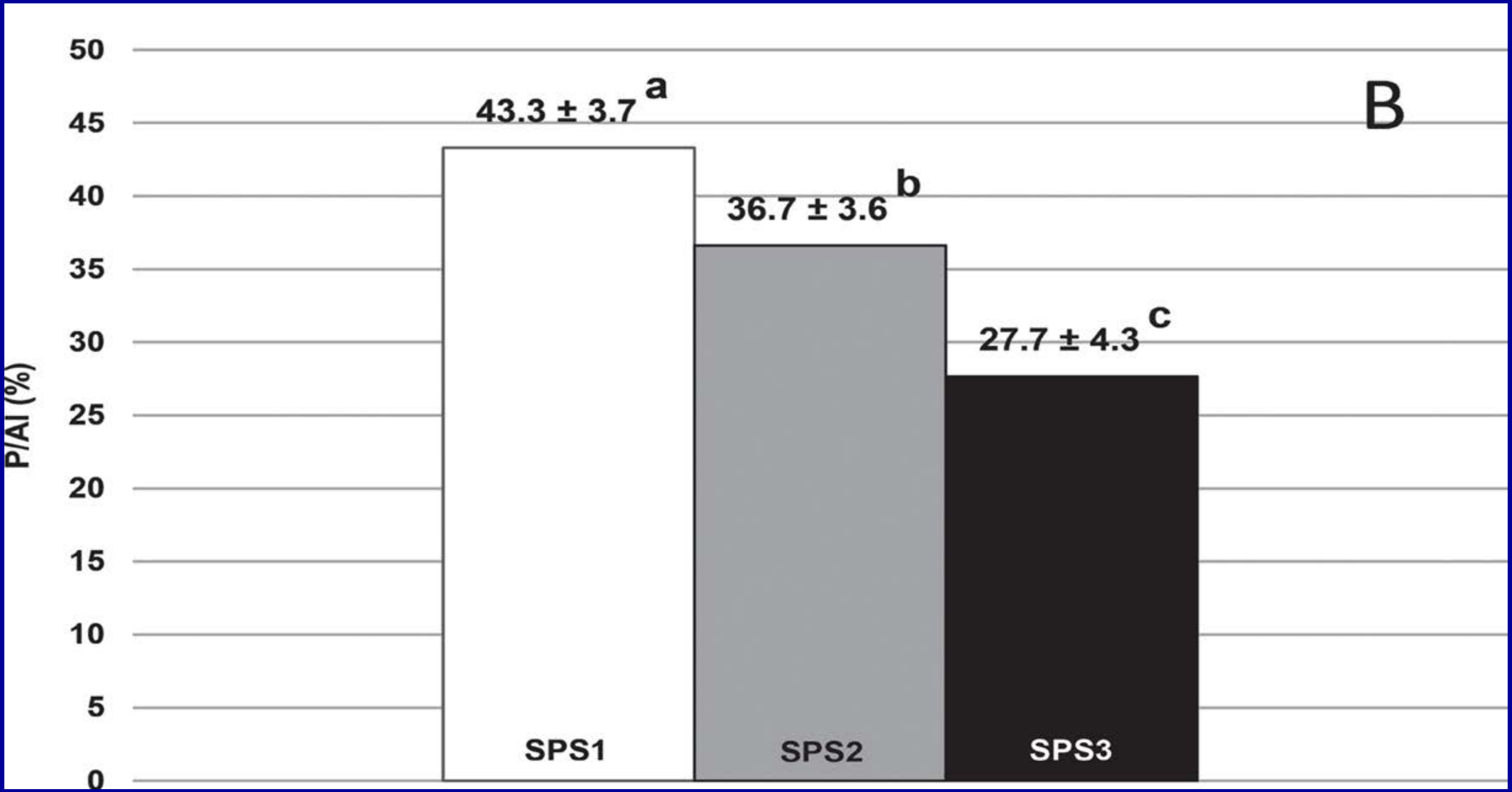


SPS1 – *size and position score 1*
SPS2 – *size and position score 2*
SPS3 – *size and position score 3*

Size and Position in Relation to Parity

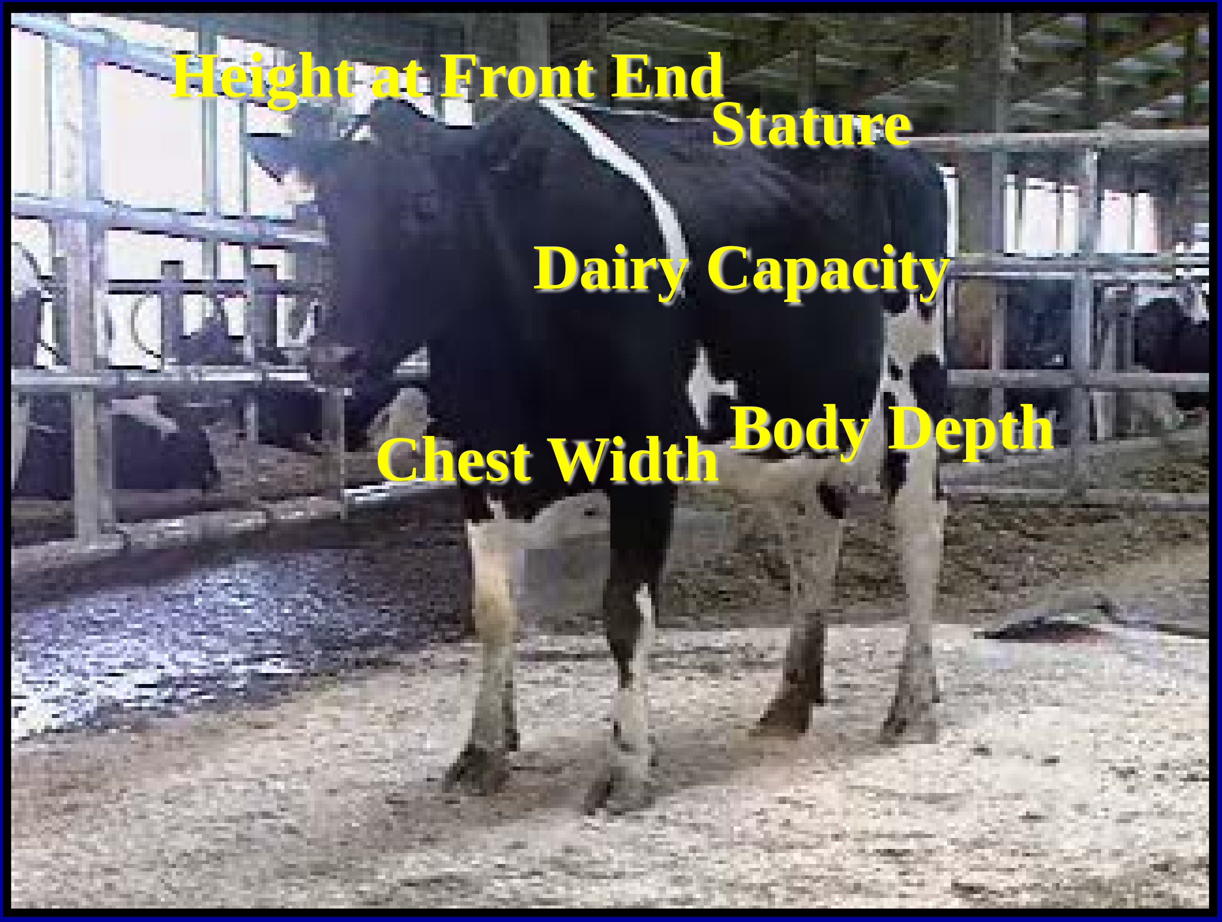


Size and Position in Relation to Pregnancy % / AI Service

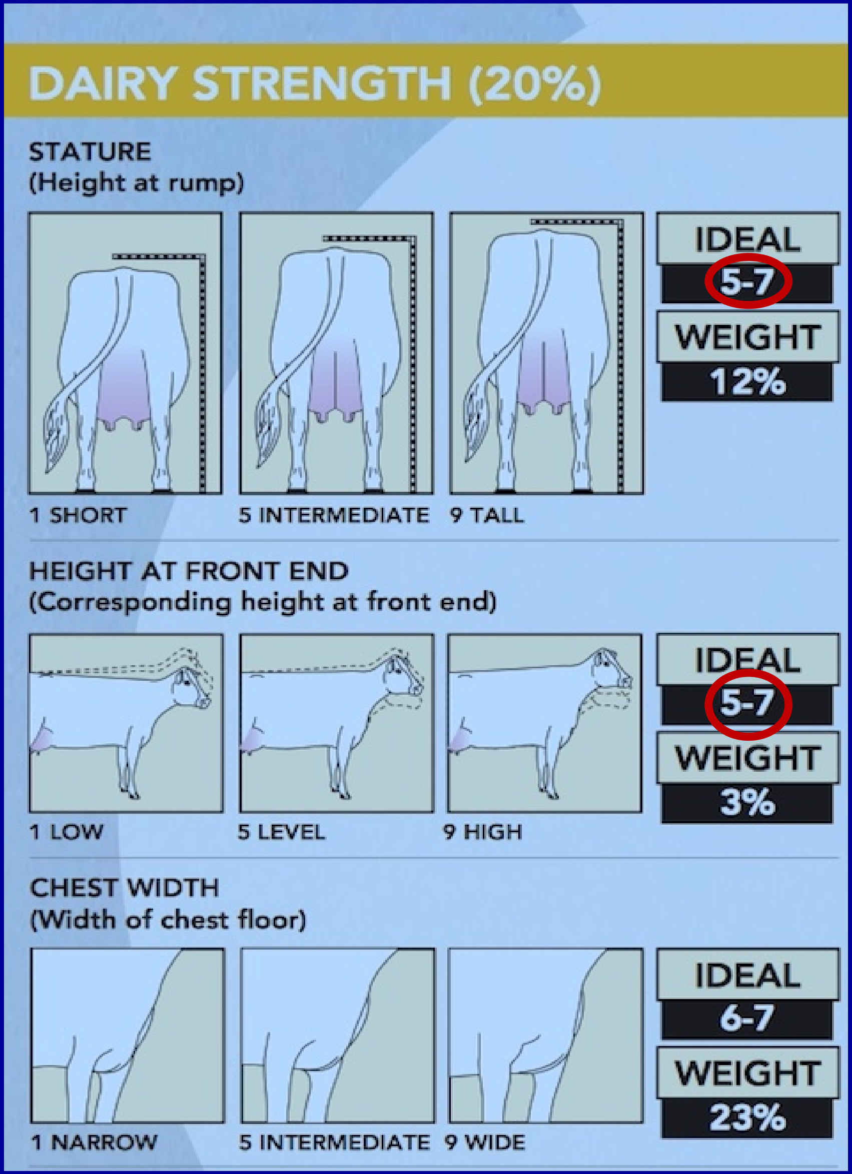


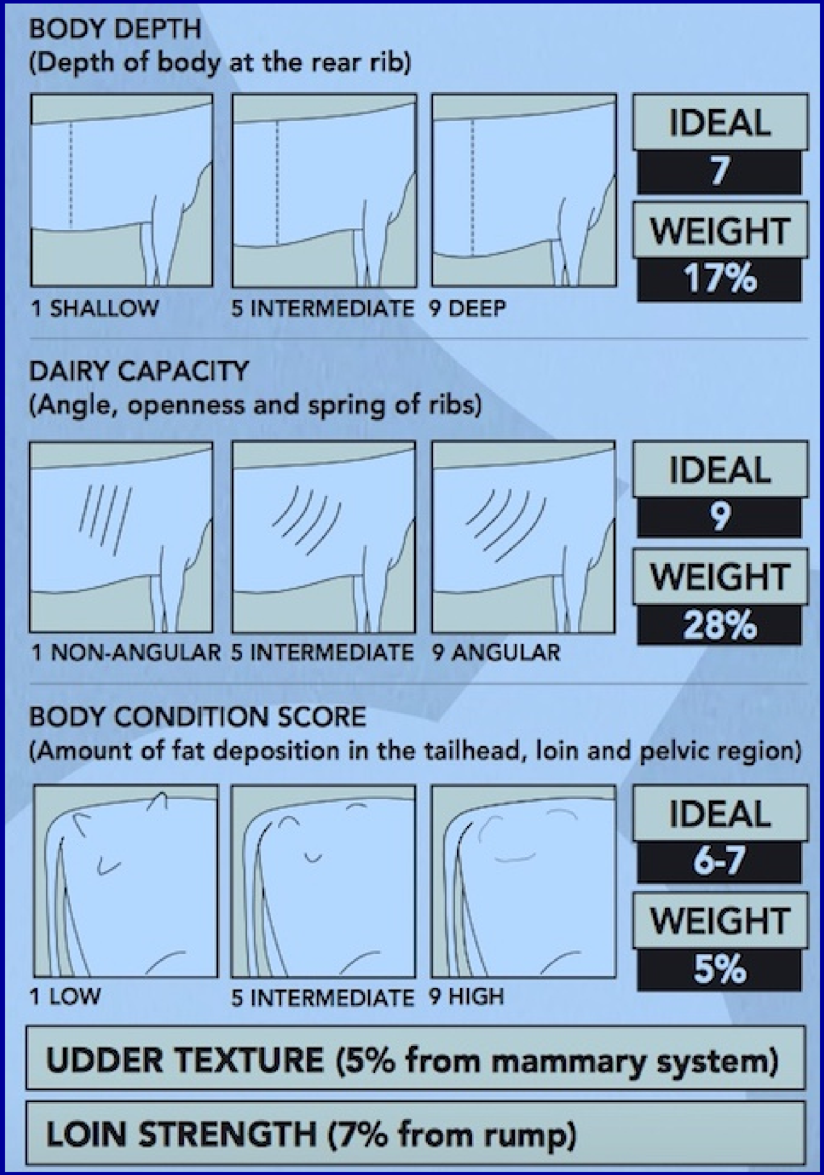
Dairy Strength

The Unique Balance of Strength and Dairy Capacity



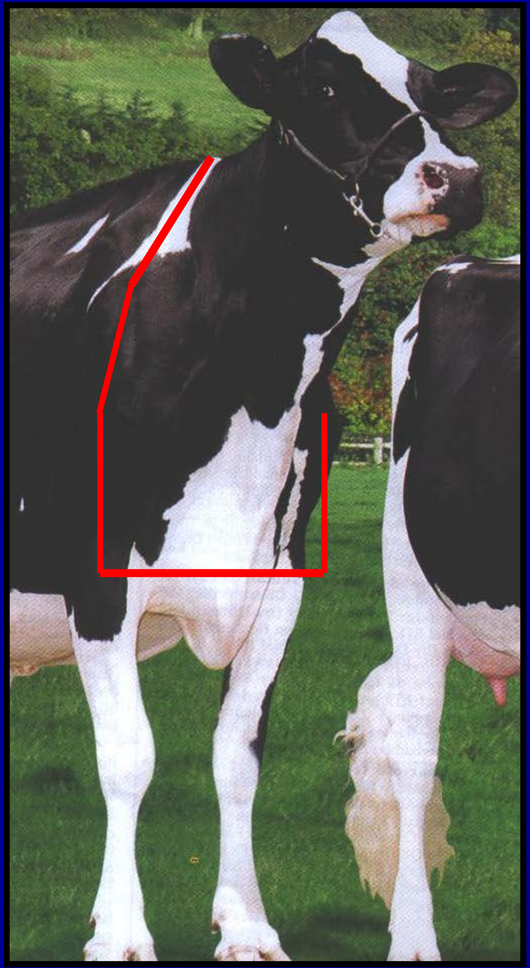
Dairy Strength (20%)

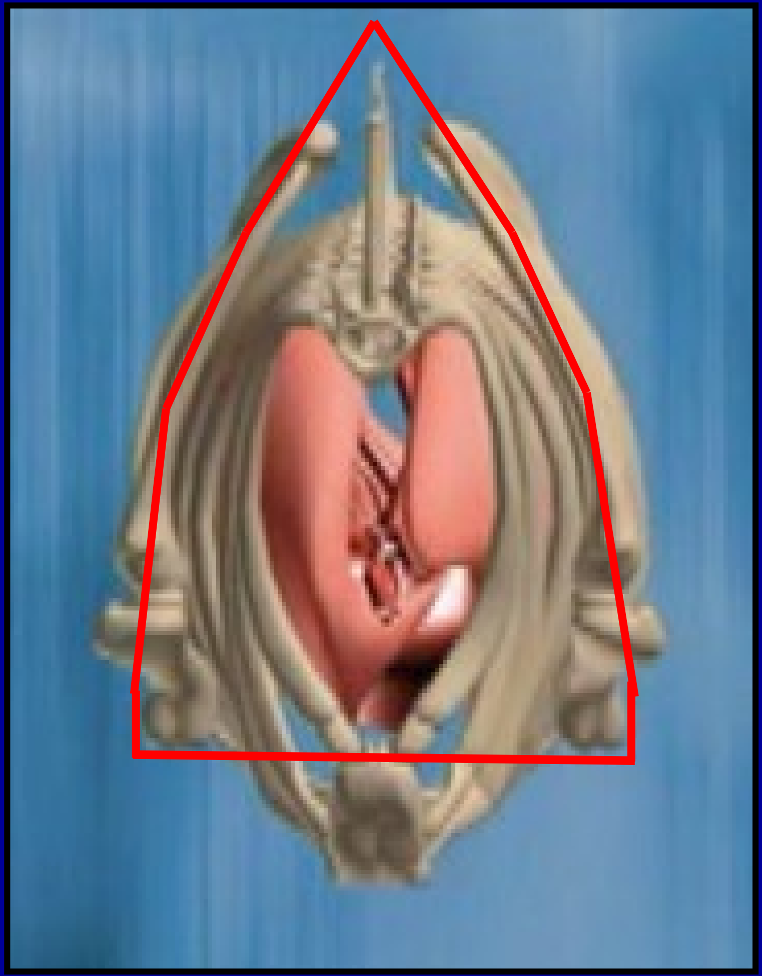


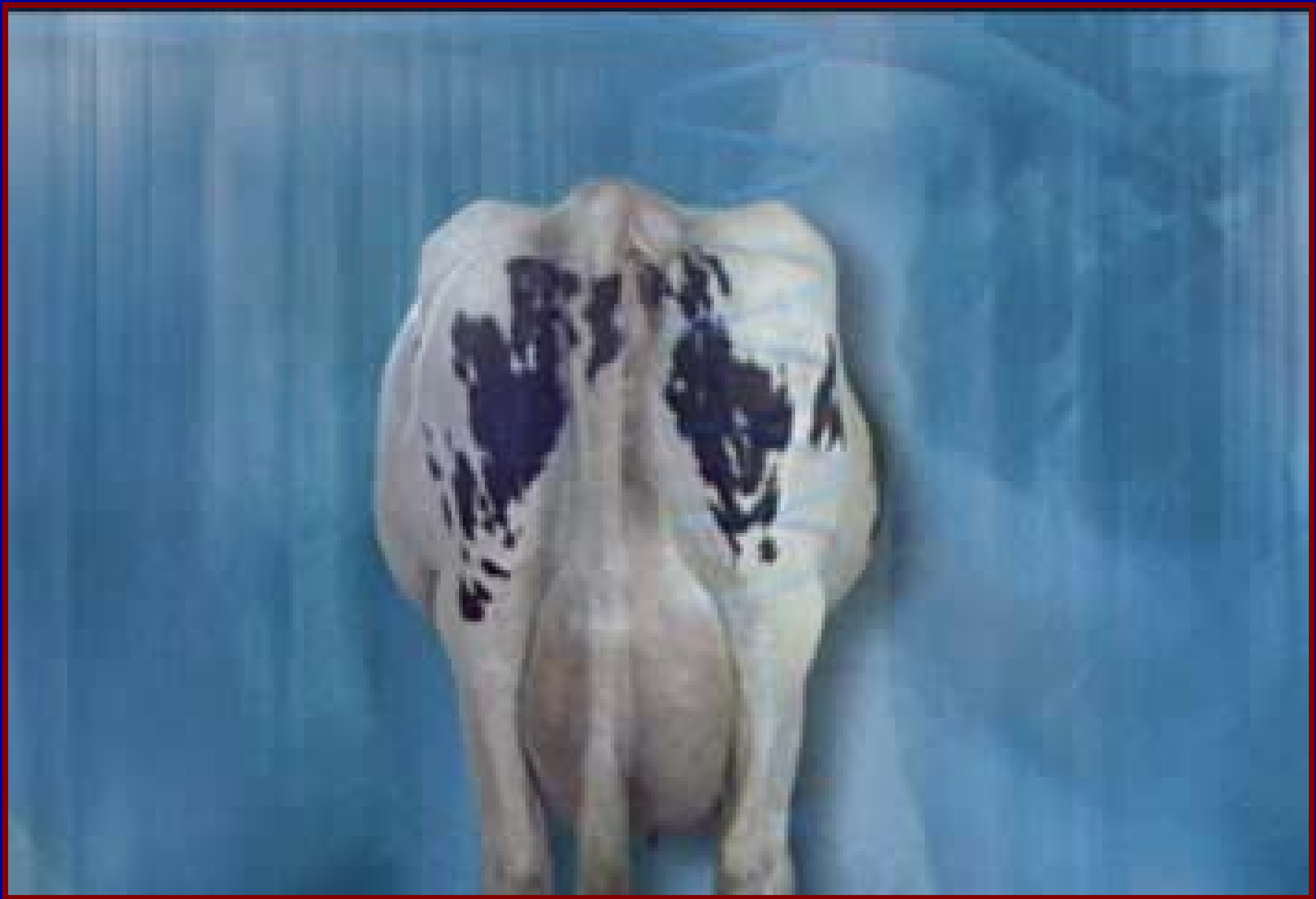


Dairy Strength (20%)

Dairy Capacity vs Dairy Form

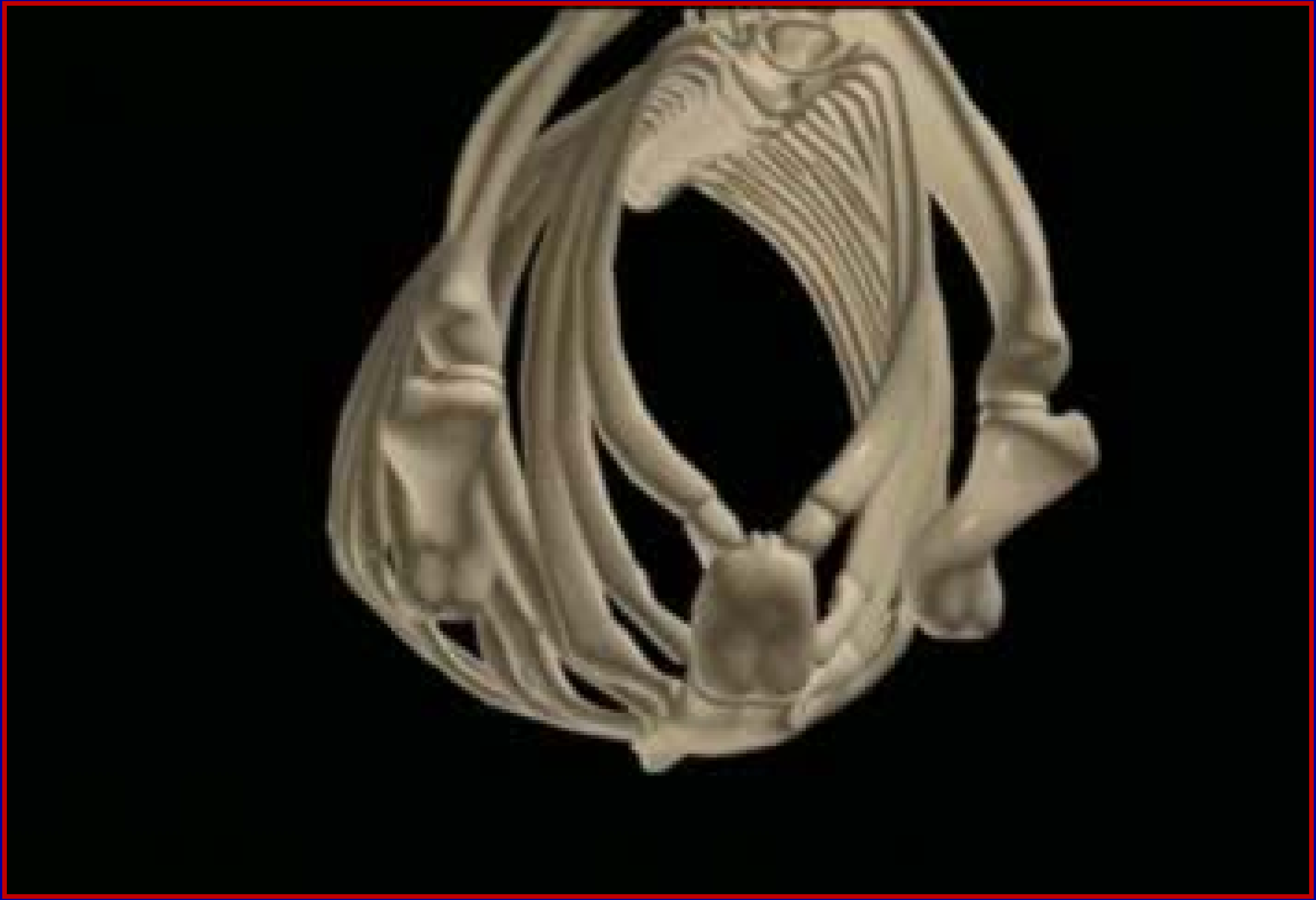


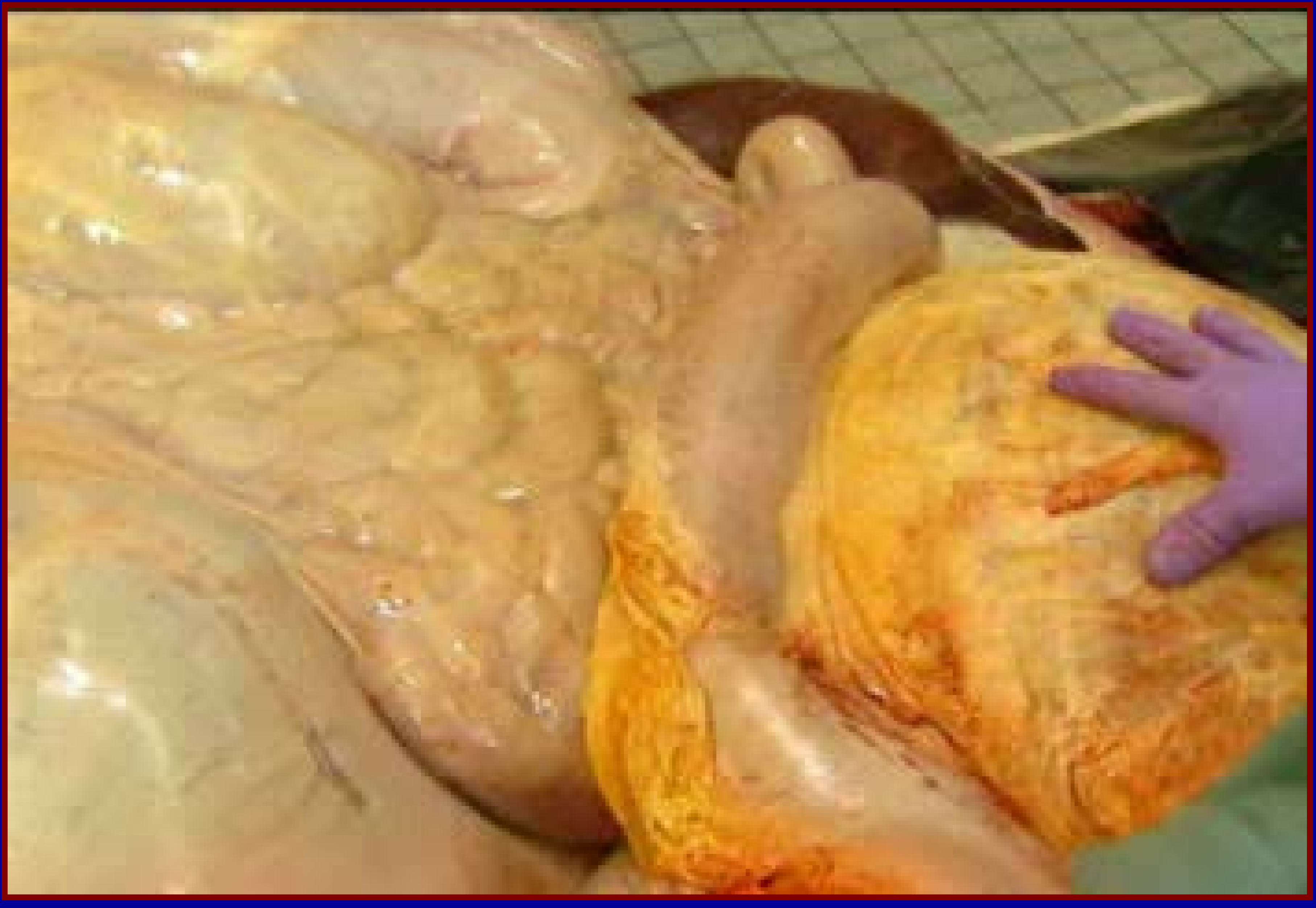





67 in.
170 cm.

We Need Capacity with Moderate Stature



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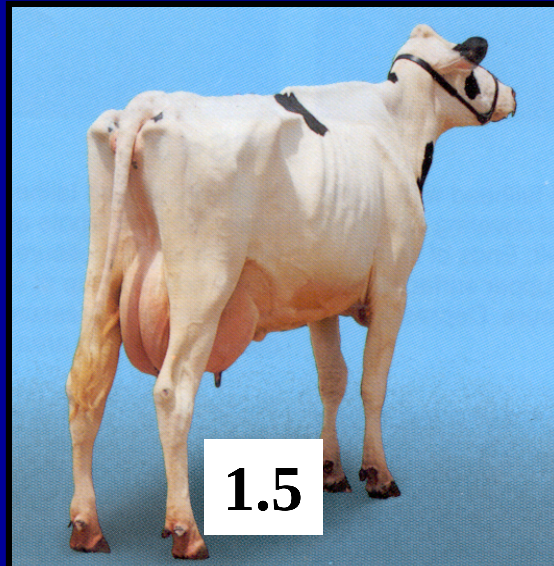
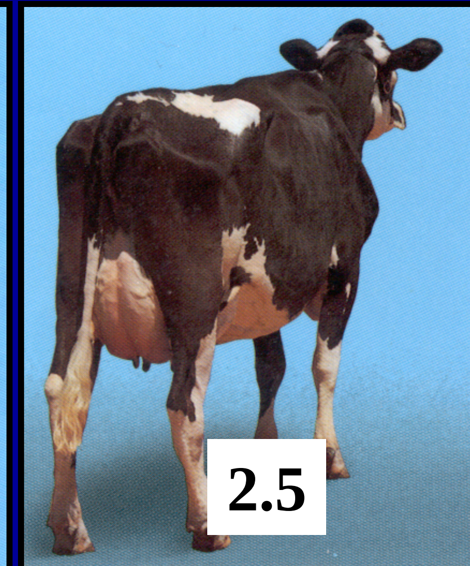
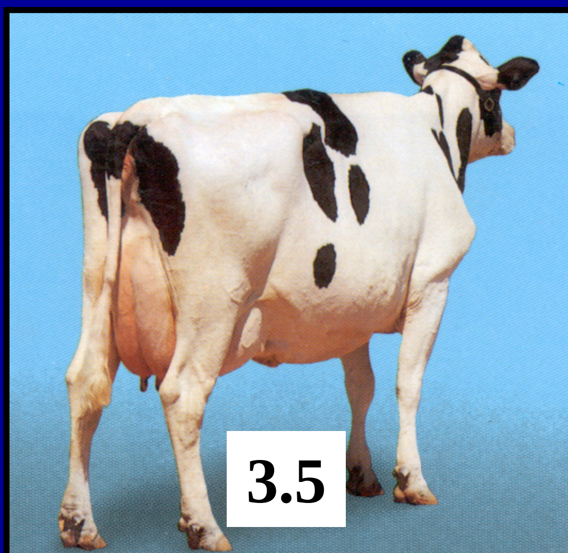
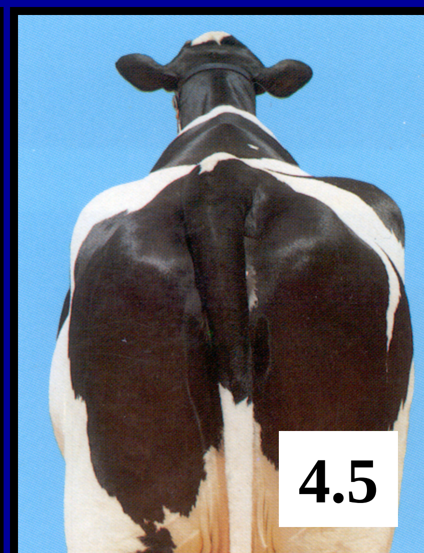




Body Condition Scoring





The Importance of BCS Management to Cow Welfare, Performance and Fertility

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Take Home Messages

- Cows attempt to regulate their body energy reserves to a target BCS during early lactation; thus, cows with greater BCS at calving will lose more BCS in early lactation.
- Increasing BCS at calving exacerbates negative energy balance in early lactation rather than preventing it.
- Genetic selection for milk production has decreased the target BCS of cows.
- Extreme negative energy balance and loss of BCS in early lactation may avoidable.
- For high producing Holstein cows in North America, BCS at calving should not be greater than 3.0.

Introduction

Dairy cows, like all mammals, store surplus energy not immediately needed in the form of fat (triglycerides) in various adipose tissues throughout the body (Friggens, 2003). The physiological regulation of pregnancy and lactation results in cyclic changes in body fat reserves, as fat is mobilized in early lactation to meet energy demands of increasing milk production and then replenished in mid- to late lactation in anticipation of the next calving and lactation.

Management of body fat content is critical to achieving the sometimes antagonistic goals of good fertility, high milk production, and health. At

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Take Home Messages

- Cows attempt to regulate their body energy reserves to a target BCS during early lactation; thus, cows with greater BCS at calving will lose more BCS in early lactation.
- Increasing BCS at calving exacerbates negative energy balance in early lactation rather than preventing it.
- Genetic selection for milk production has decreased the target BCS of cows.
- Extreme negative energy balance and loss of BCS in early lactation may avoidable.
- For high producing Holstein cows in North America, BCS at calving should not be greater than 3.0.

▪ So What Should *Our* Target BCS Be?

From the standpoint of the cow's biology, the concept of the target BCS argues strongly that a thinner cow (but not undernourished and unhealthy) will be more likely to meet the combined goals of health, production and reproduction. It is to some degree a different question to ask what the optimal BCS at calving should be for best management outcomes.

Until the last decade or so, many experts recommended a higher BCS (3.5 to 4.0) at calving. The rationale was that cows became thin at peak lactation, perhaps having difficulty in conceiving and maintaining a subsequent pregnancy. A higher BCS at calving was thought necessary to provide a "reserve" to let cows "milk off their backs" to avoid this scenario. As we know now, however, striving for a higher BCS at calving actually promotes this scenario rather than preventing it. As Garnsworthy's (2007) research clearly shows, cows with higher BCS lose more BCS after calving. Over time the normal BCS curve (essentially the inverse of the lactation curve) becomes distorted, with higher maximums and lower minimums, all with struggles of transition health problems, poor fertility, disappointing milk yield, and decreased herd life.

The optimal BCS for maximum milk yield may vary across productions systems, as compared by Roche et al. (2009). For example, cows in grazing systems are more likely to be too thin going into dry-off. Outcomes from differing BCS also are dependent on the genetic potential for milk within those systems. This is shown conceptually in Figure 2. If cows of high genetic merit calve with high BCS they will lose BCS, whereas if they calve in thin BCS they will maintain BCS. In contrast, low-merit cows that calve with high BCS will maintain BCS, but low-merit cows calving in thin condition will gain BCS. All of these outcomes can be predicted from the concept that increasing genetic merit for milk also means that we are selecting for a thinner cow with a lower target BCS. Garnsworthy (2007) estimated that the target BCS for high-merit Holsteins in the UK had decreased from about 2.49 to 2.10 in approximately 20 years. A calving BCS of approximately one-half score unit above the target seems reasonable, which means that BCS at calving should be around 2.75.

Rounded Hooks

Hooks round

BCS = 3.0

Angular Hooks

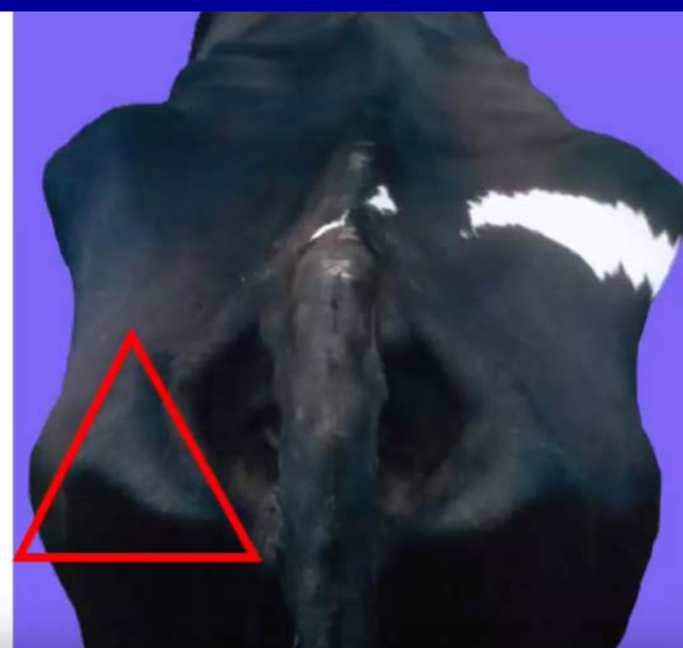
Hooks angular
Will score 2.75 or less

Padded Pins

Pins visibly padded
BCS = 2.75

Angular Pins

Pins angular
Will score below 2.75

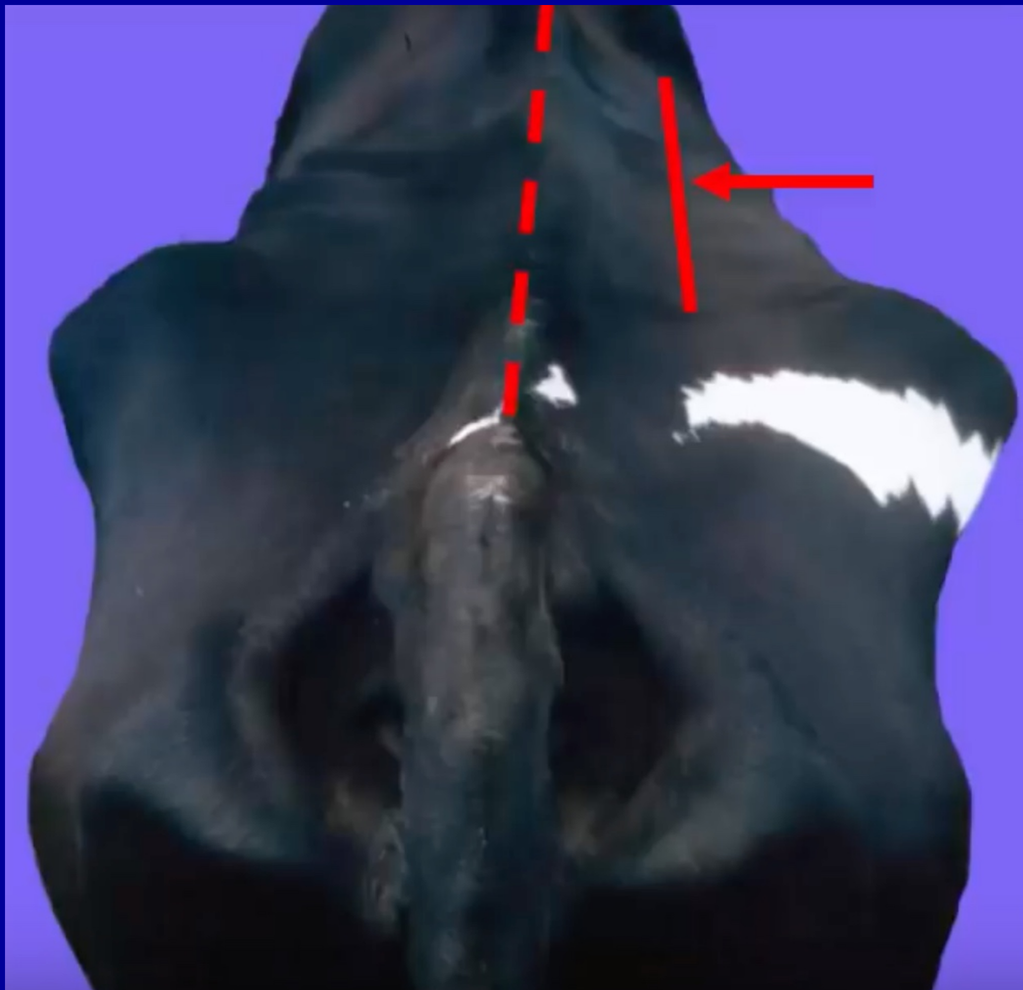


Palpable Fat Pad on Pins

Fat pad present
BCS = 2.5

No Fat Pad on Pins

No fat pad
Will score below 2.5



Visible 1/2 the distance

Ribs visible halfway to the spine

BCS = 2.25

Visible 3/4 the distance

Ribs visible three-fourths of the distance to the spine

BCS = 2.0