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Analysis of influences on uneven pressure distribution between inner and outer claws in dairy cows

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Objectives

- Comparison of pressure distributions between young and adult German Holstein cattle
- Determination of factors causing unequal pressure distribution between outer and inner hind claws
- Evaluation of individual risk factors in order to avoid claw lesions and productivity losses due to overload on the outer hind claws

Animals

- **Study A:**
  35 female German Holstein cattle
  age: 3 to 18 months

- **Study B:**
  32 German Holstein cows
  12 cows in 1st lactation
  10 cows in 2nd lactation
  10 cows in 3rd or 4th lactation

Measurements

<u>Study A:</u> every 6-8 weeks

<u>Study B:</u> Calving

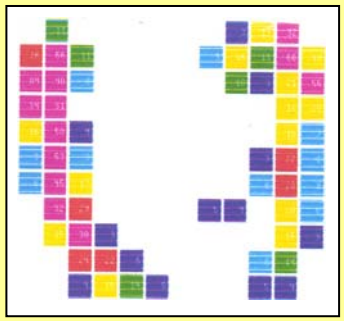
⇩

Measurement (untrimmed)

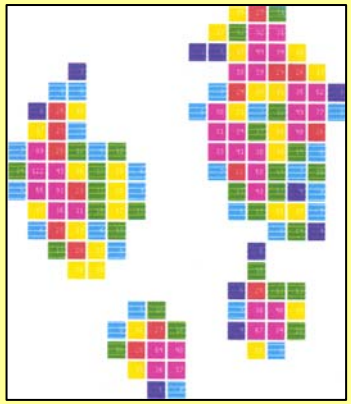
⇩ ***Claw trimming***

Measurements every 3 weeks for 7 months

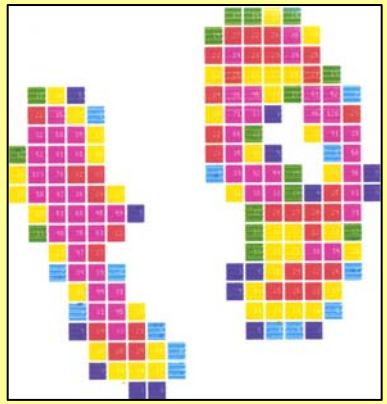
Pressure distribution



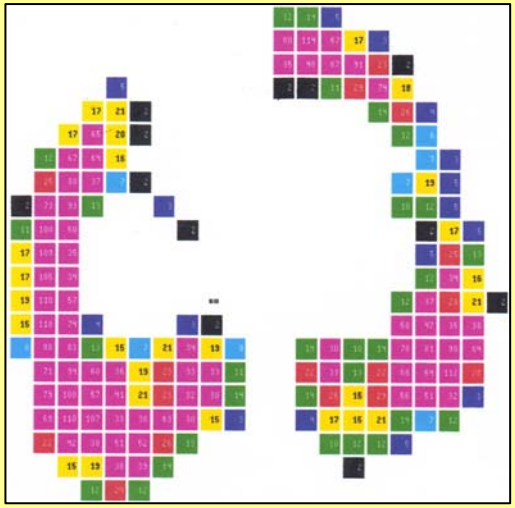
4 months



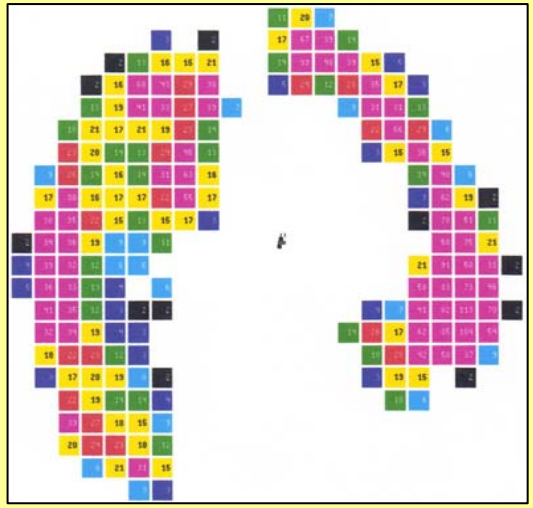
8 months



16 months



after 1st calving, untrimmed



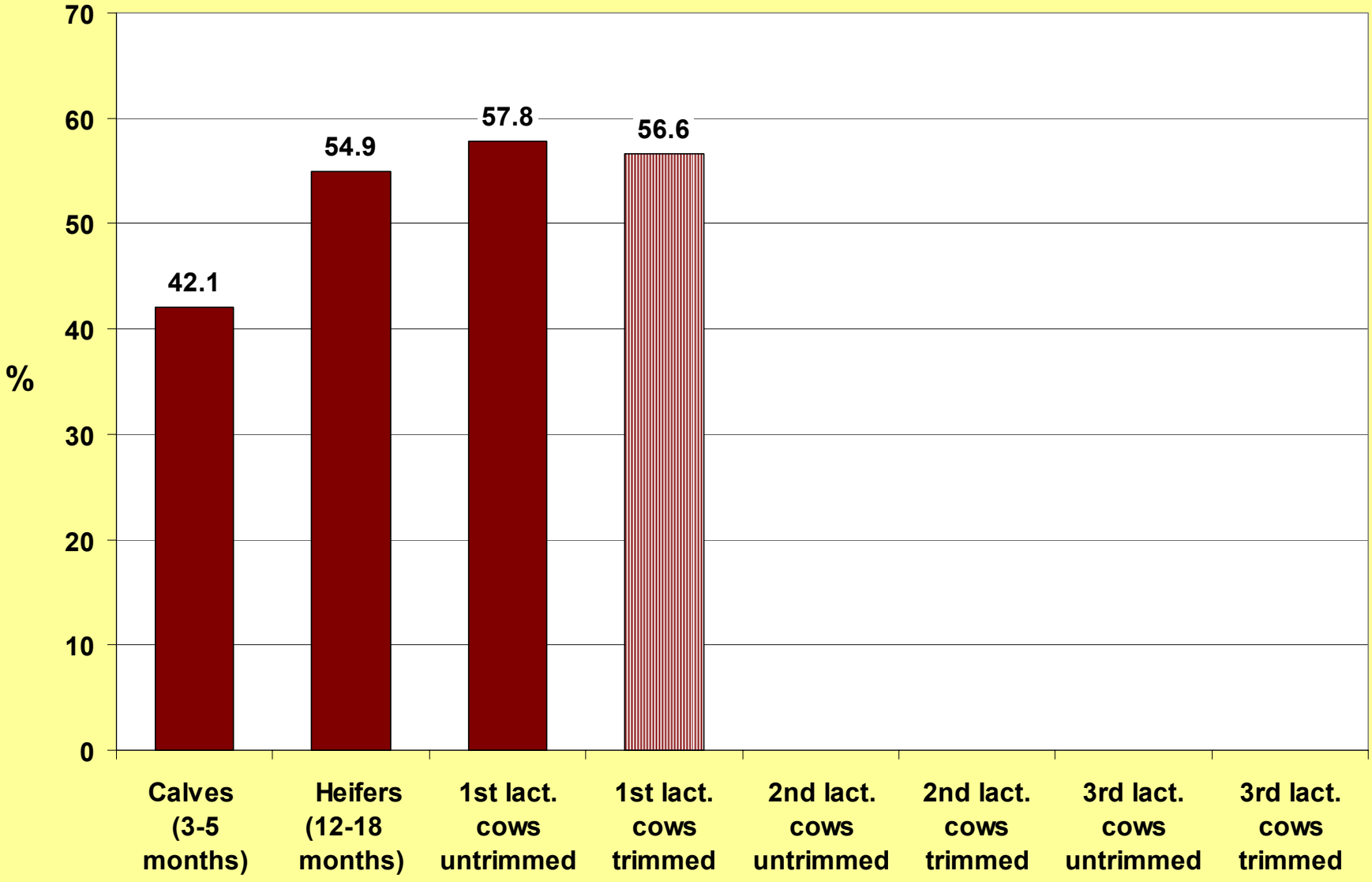
after 1st calving, trimmed

Analyzed traits in hind limbs

- **Relative ground surface area of the outer claw (%)**
- **Relative weight on the outer claw (%)**
- **Ratio of mean pressure load:**
  inner claw (N/cm²) / outer claw (N/cm²)
- **Body and udder measurements**
  → Correlation with area, weight and pressure

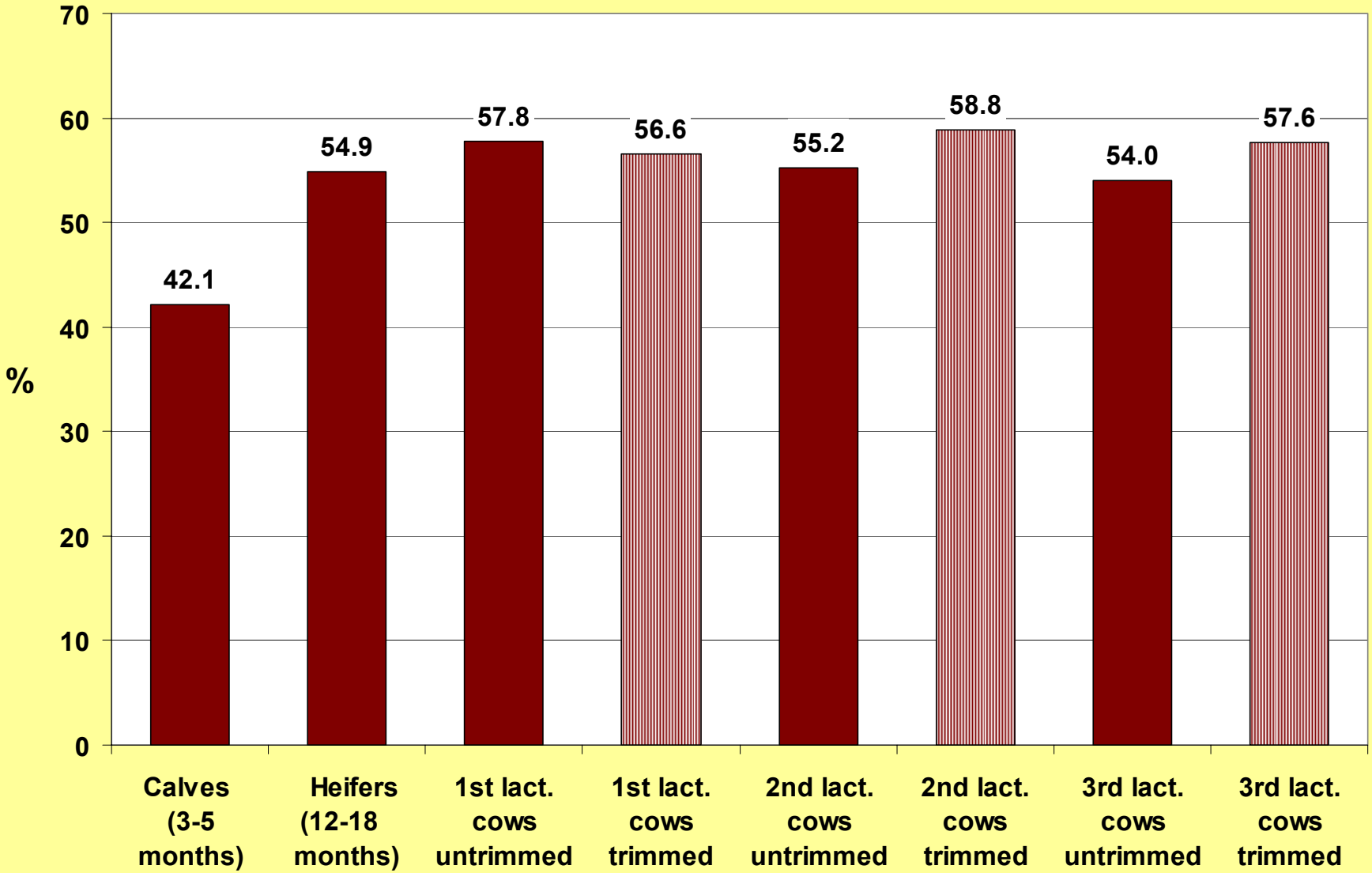
Results:

Relative ground surface area of the outer hind claw



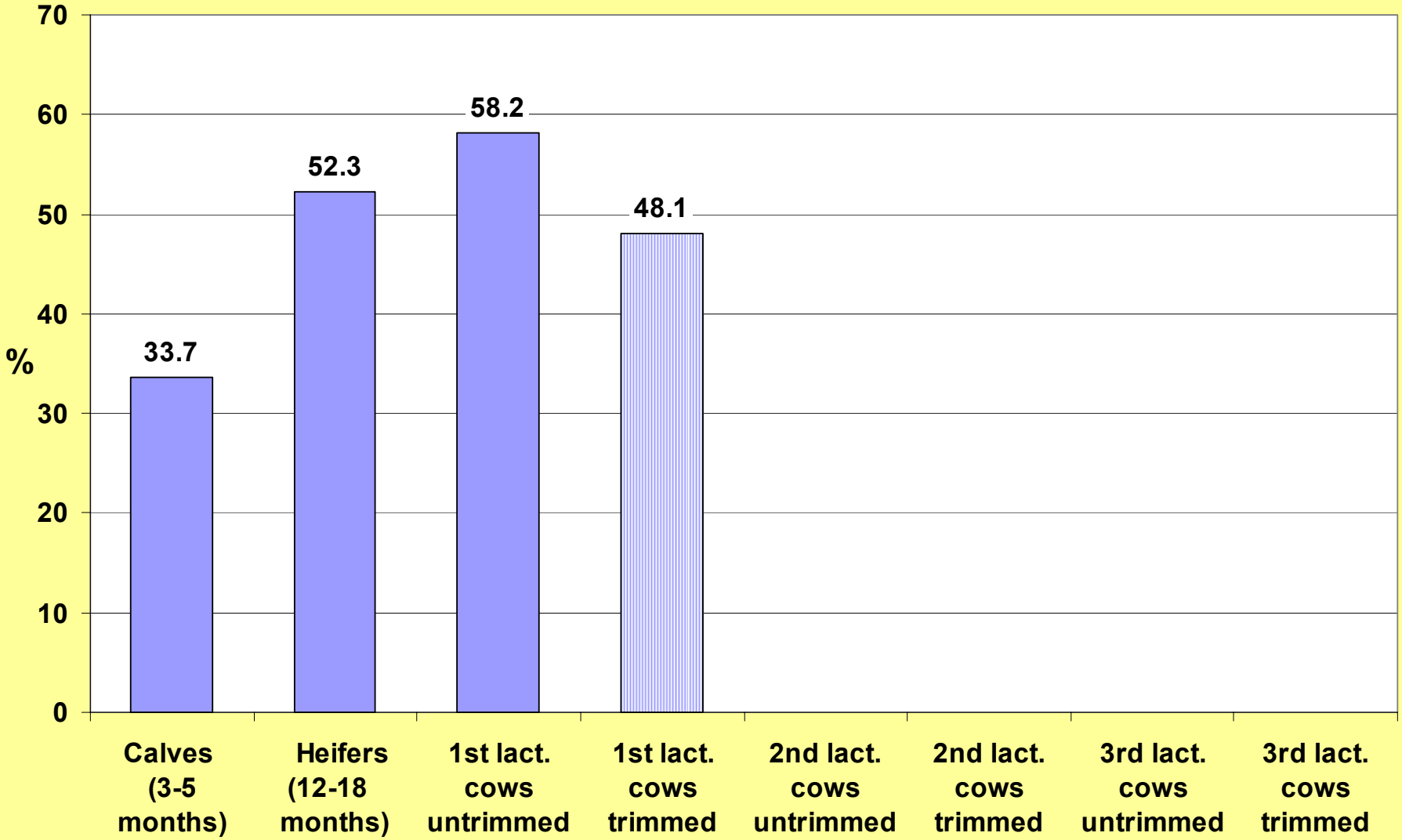
Results:

Relative ground surface area of the outer hind claw



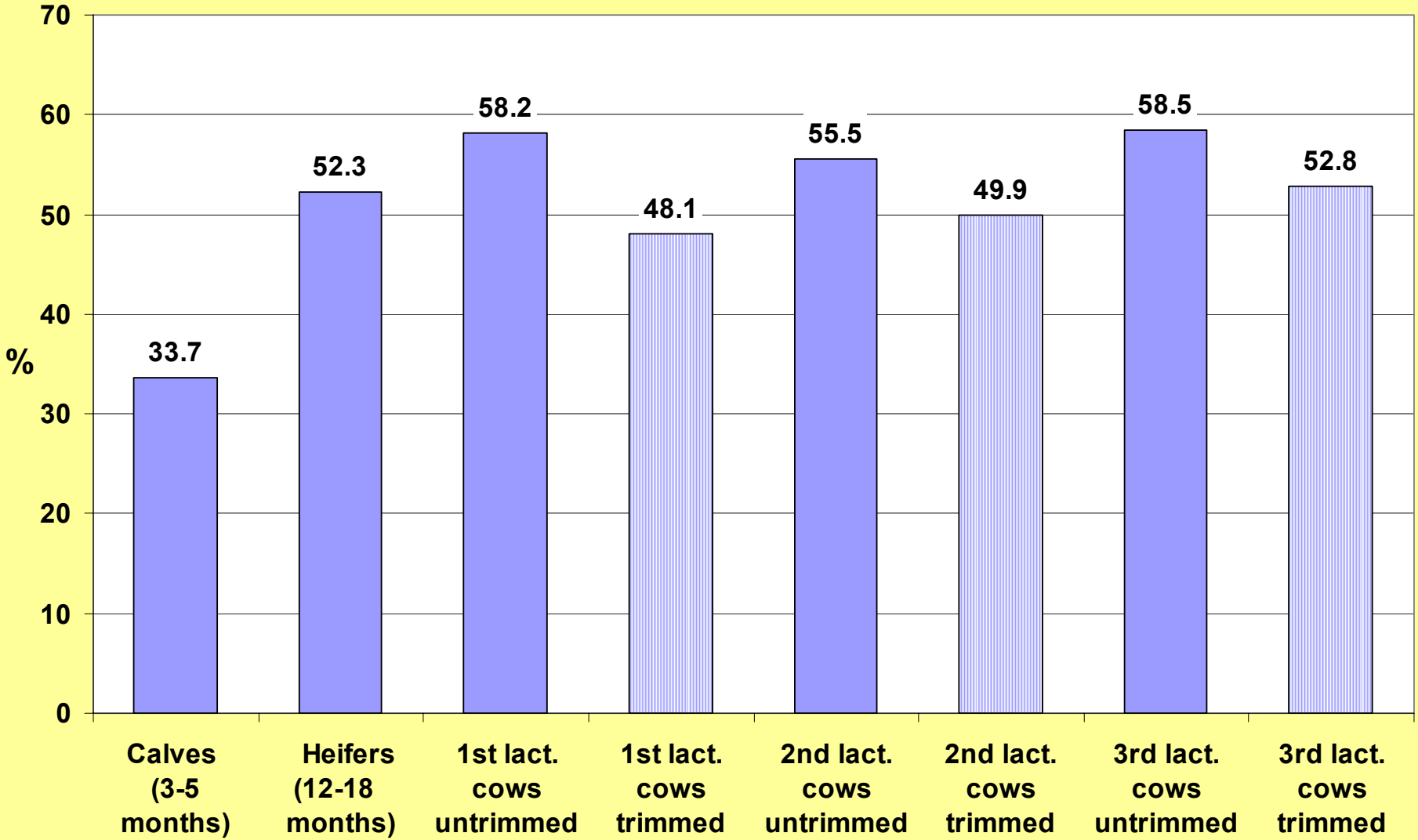
Results:

Relative weight on the outer hind claw



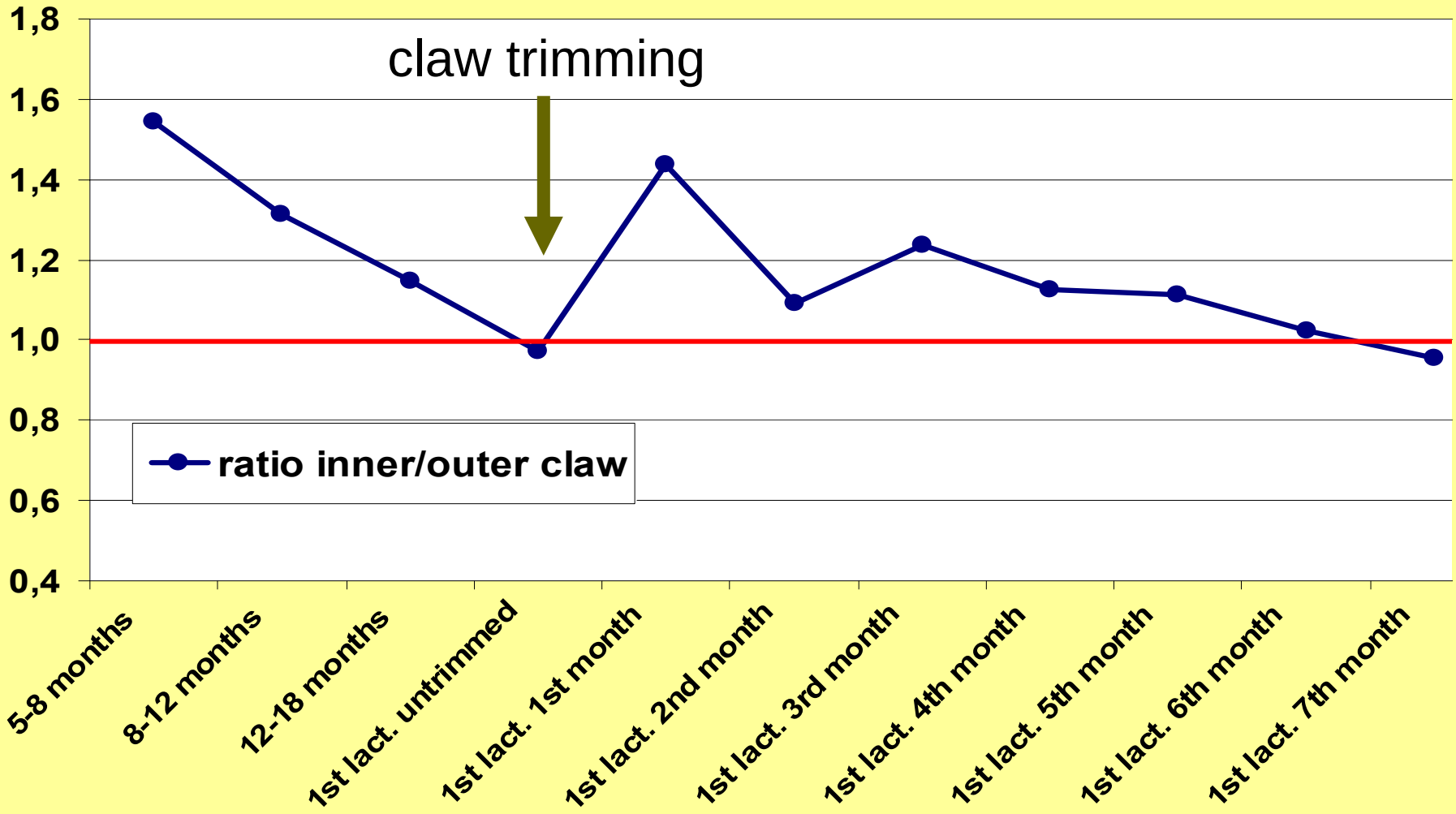
Results:

Relative weight on the outer hind claw



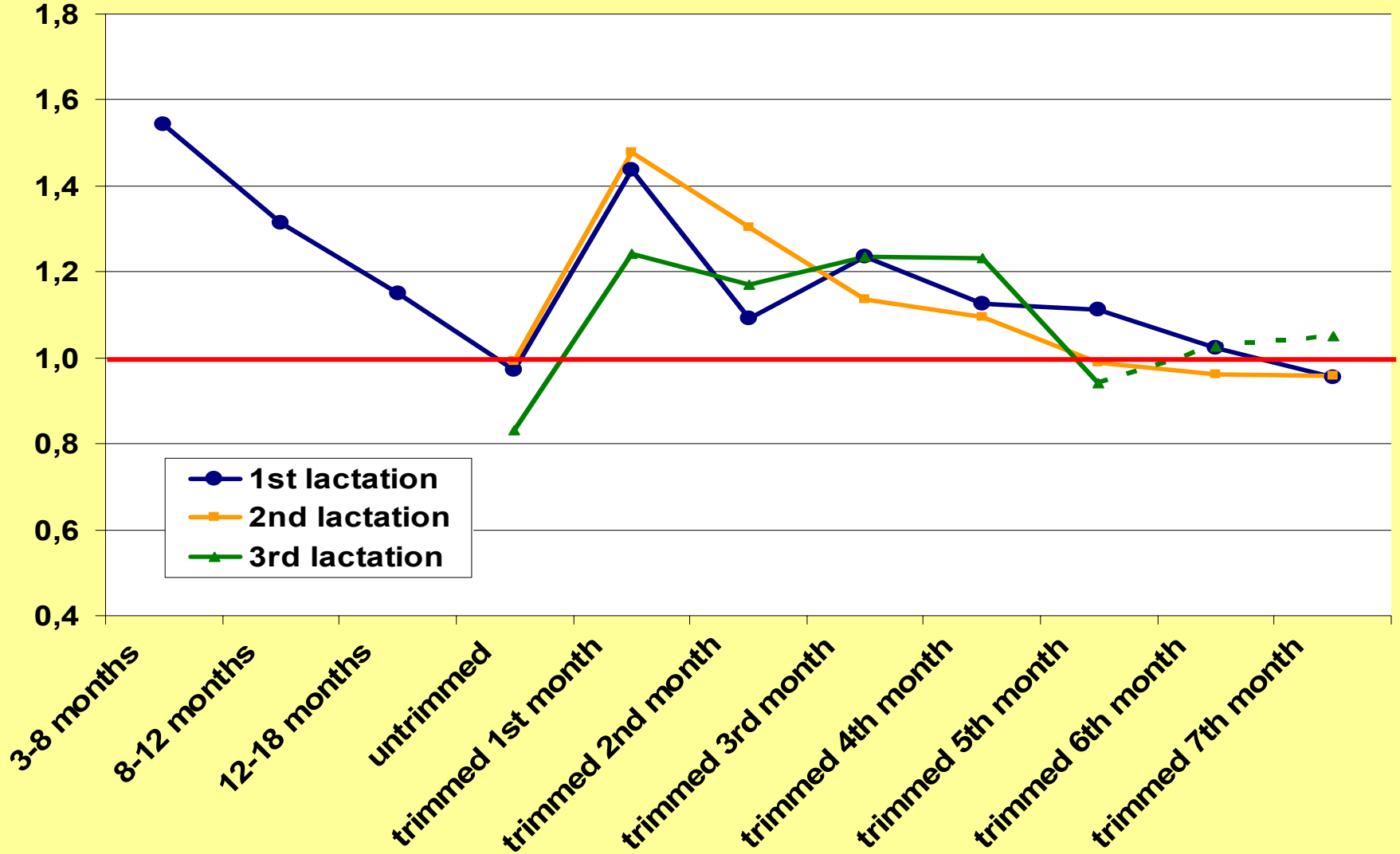
Results:

Ratio of mean pressure load



Results:

Ratio of mean pressure load



Results:

Correlations of body and udder with claw traits

	relative area	relative weight	ratio of pressure
withers height	n.s.	n.s.	n.s.
chest circumference	n.s.	n.s.	n.s.
width of pelvis at large trochanter	n.s.	n.s.	n.s.
udder - length	*	n.s.	n.s.
udder - width	n.s.	n.s.	n.s.
udder - depth	* *	n.s.	n.s.
udder - circumference	+	n.s.	n.s.

+: P < 0.10; *: P < 0.05; **: P < 0.01

Summary of results

- **Relative area of ground surface**

  increasing age → shift from inner to outer hind claw; scarcely affected by claw trimming

- **Relative weight**

  increasing age → shift from inner to outer hind claw; status of heifers can be achieved by claw trimming, but not for a long time

- **Mean pressure load – ratio (inner to outer hind claw)**

  increasing age → decrease

Conclusions

- **Obvious positive effects of claw trimming with respect to load and pressure distribution between inner and outer hind claw**
- **Recommendation of claw trimming intervals ≤ 4 months, particularly for > 2nd lactation cows**
- **Effect of udder size on surface area, but not on relative weight or pressure ratio**
- **No correlation between body measures and claw traits**

Thank you for your attention!

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