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Introduction

Grazing land cost and availability, adverse weather conditions, excess feed yard capacity and market volatility have stimulated interest in controlled environment cow/calf production systems. In this system, nutrient availability can be controlled. During lactation, it is unknown whether increased cow feed intake results in economically justifiable increased calf performance. The purpose of this research is to define cow and calf responses to a range of feed allowance provided to lactating beef cows.

Hypotheses

In a controlled environment system, beef cow maintenance and calf growth efficiency is achieved at a cow energy intake below NRC requirements. Stimulating increased milk production through increased cow feed intake is not economically sustainable.

Objective

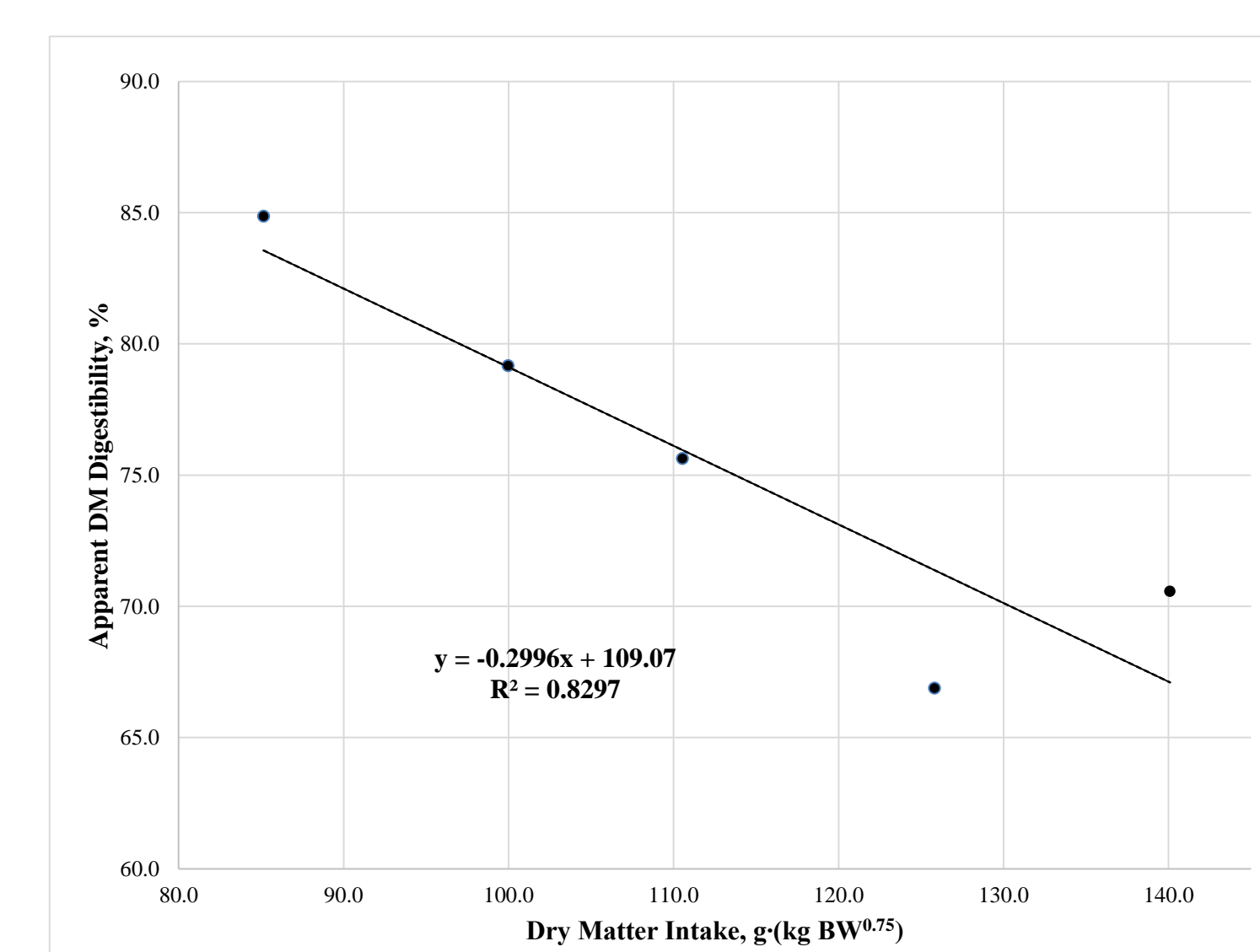
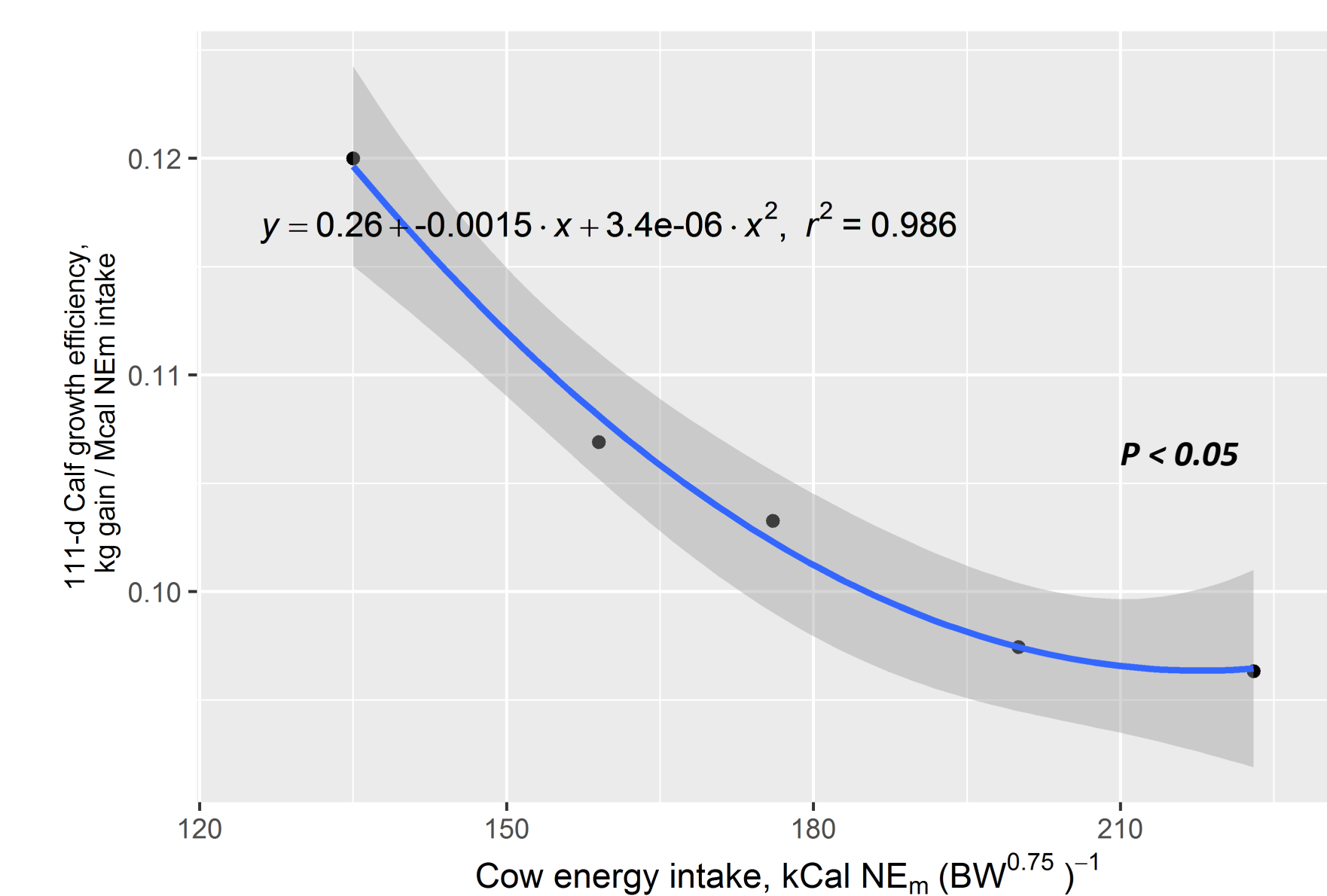
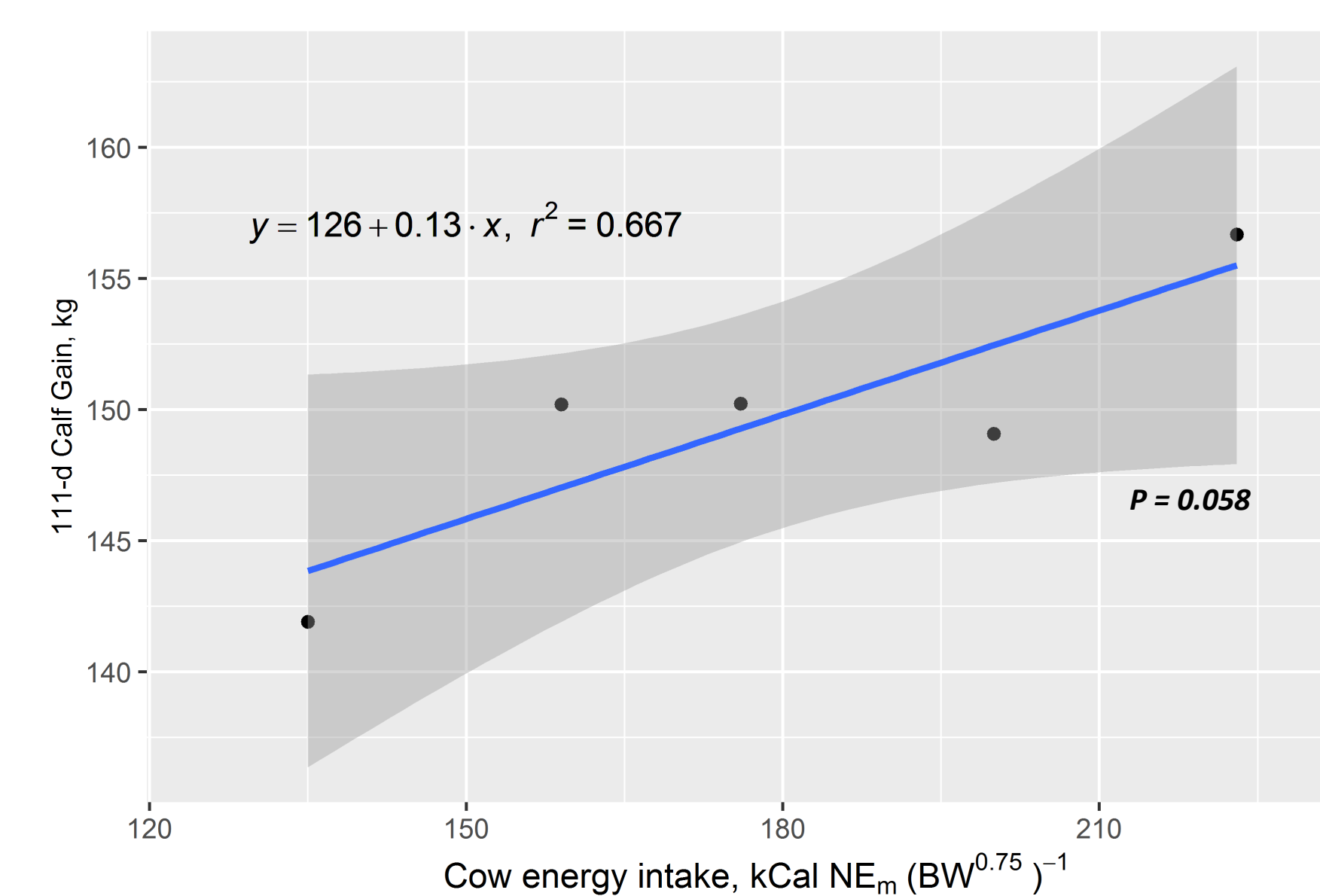
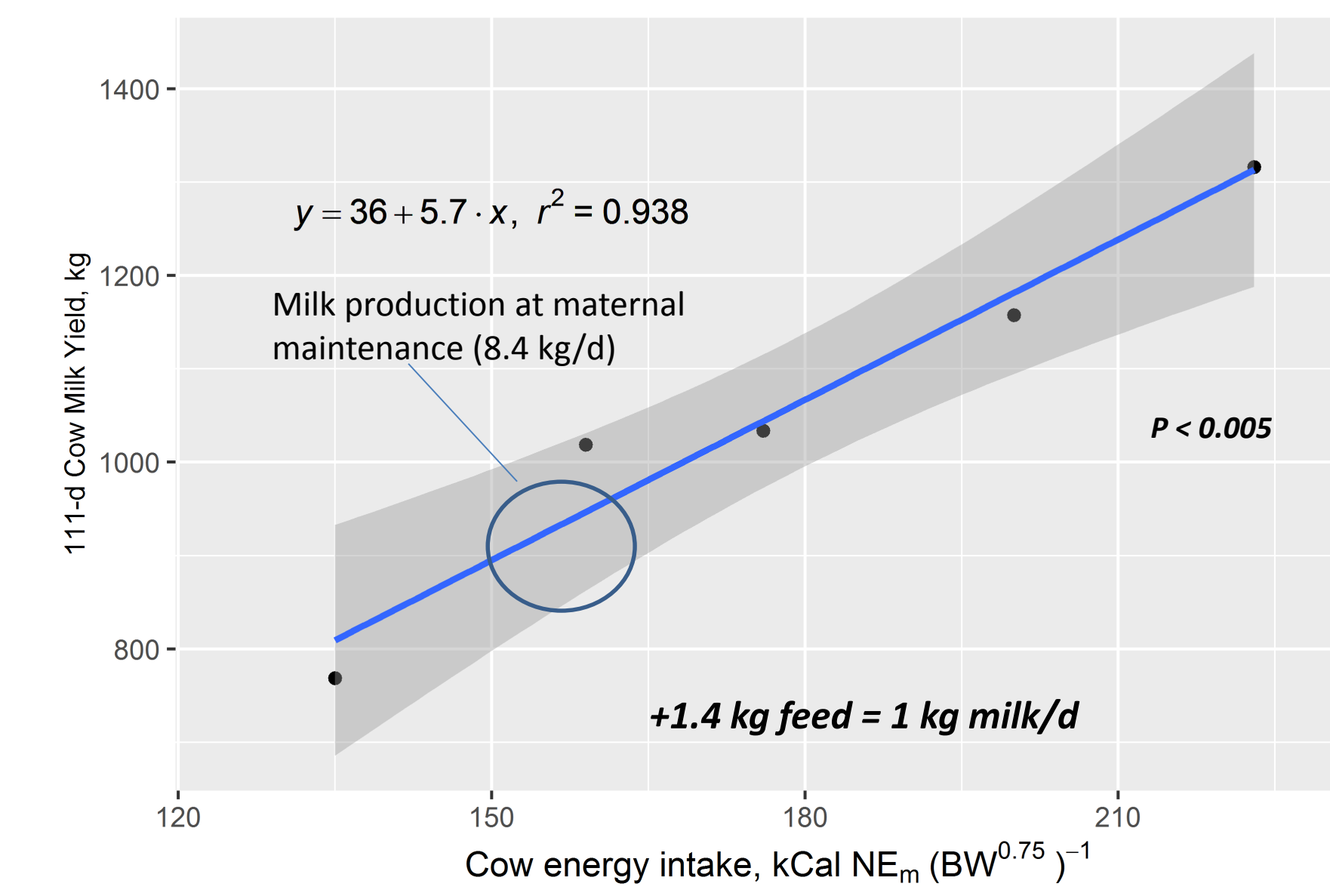
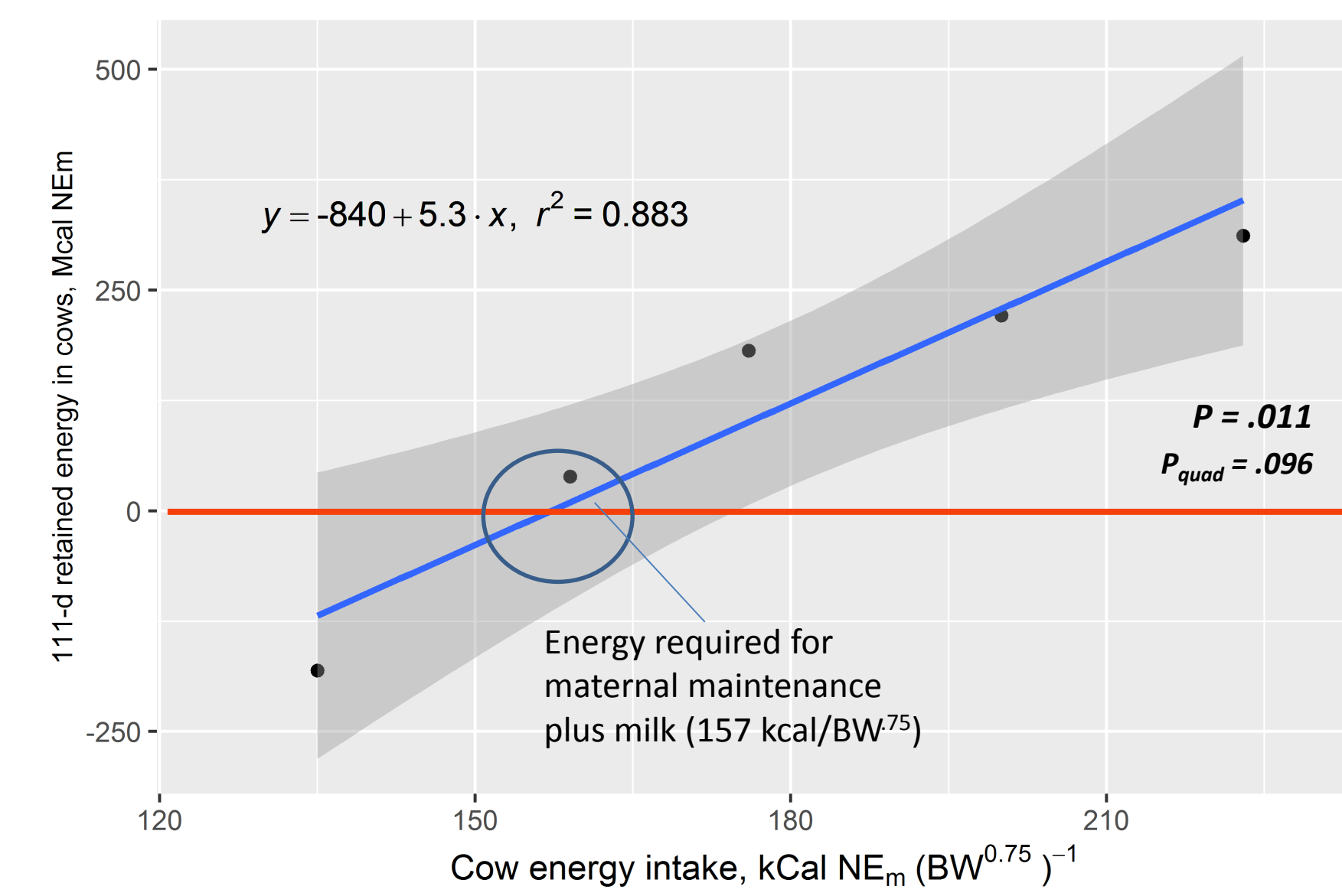
Identify lactation period energy intake necessary to achieve optimal energy utilization efficiency and acceptable cow body composition

Materials and Methods

- 40 lactating cows (6 ± 2.0 yr, 539 ± 48 kg BW) and 40 suckling steer calves (60 ± 9.4 d, 107 ± 12 kg BW) were stratified by calf age and milk yield and assigned to 1 of 5 treatment groups.
- Cow/Calf pairs were housed in pens with fence-line feedbunks at a rate of 0.9 M per cow and 0.3 M per calf. Each pen had shaded area and an automatic waterer
- Cows were fed 8 to 14.2 kg per head of the same diet to achieve 118, 138, 154, 172, 187 kcal of NE_m per kg metabolic BW per head per day
- Calves had ad libitum access to creep feed and did not have access to cow feed
- The diet was 14% crude protein and 1.59 NE_m Mcal/kg and consisted of 54.8% Sweet Bran, 30% prairie hay, 12.7% cracked corn, and 2.5% limestone (38%)
- The same diet was fed across all treatments and the range of feed energy intake was accomplished by varying the amount of feed provided.
- Cow BW, BCS, milk yield/composition, body composition and digestibility was measured
- Calf weight change, feed intake, body composition and digestibility was measured

Kcal $NE_m \cdot (kg BW^{0.75})^{-1} \cdot d^{-1}$	Diet Fed, kg (DM) / d	Approximate % NRC
135	8.7	73.8
159	10.8	88.5
176	12.5	101.6
200	14.1	113.2
223	15.2	119.8

Results



Conclusions

- As cow energy intake increased, cow BW, BCS, retained energy, body composition and milk fat increased. Energy intake (milk & total intake) as well as back fat increased in the calves as well.
- As cow energy intake (and milk production) increased, calf creep feed intake did not change.
- Calf weight gain increased marginally as cow energy intake increased.
- As a result, efficiency of feed utilization declined with increased cow energy (feed) intake.
- For a calf to gain an additional 1 kg/d BW from milk, cows would need to consume 27 kg more feed on a daily basis.
- Dry matter digestibility decreased as cow feed intake increased.
- Energy is partitioned to both maternal tissue and milk production. The current NRC model assumes no change in energy use for milk as energy intake increases or decreases.
- Milk yield can be increased by at least 28.8% with increased feed beyond maintenance.
- Maternal tissue maintenance was achieved at 87.4% NRC.
- Increasing cow energy intake beyond maternal tissue maintenance is inefficient.

Comparing Requirements:

Maintenance
 NRC, 2016: $NE_m = 77.0 \text{ kcal} / BW^{0.75}$
 Bayliff, 2015: $NE_m = 87.0 \text{ kcal} / BW^{0.75}$

NRC estimates average peak milk yield to be 9 kg for a 545 kg cow. The cows used in this experiment peaked at 13.6 kg at a BW of 519 kg.

Acknowledgements

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