The California Commercial Beef Cattle Ranch Project

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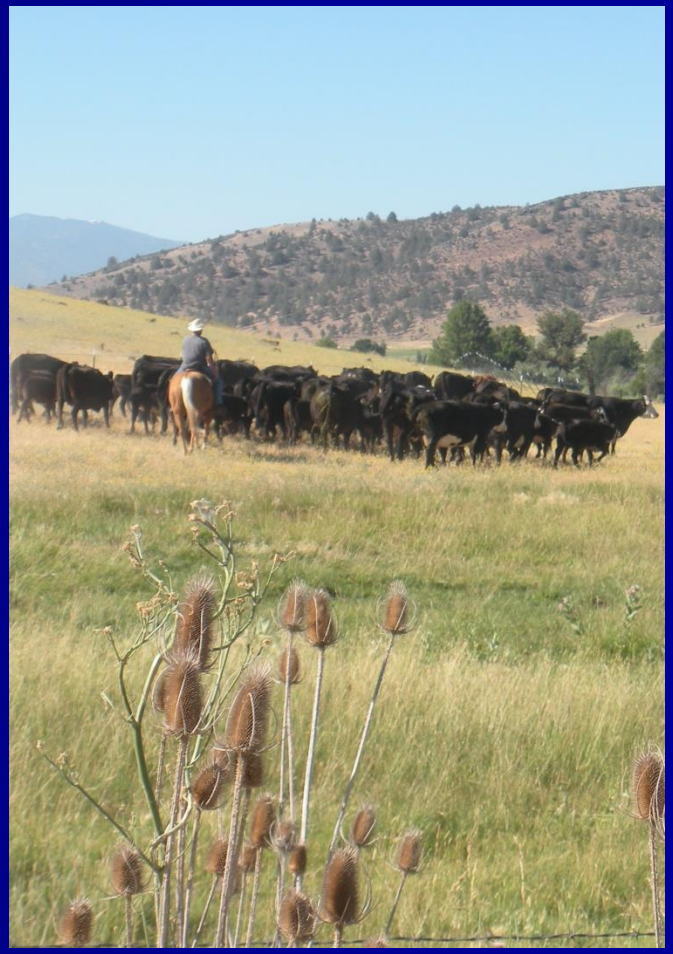
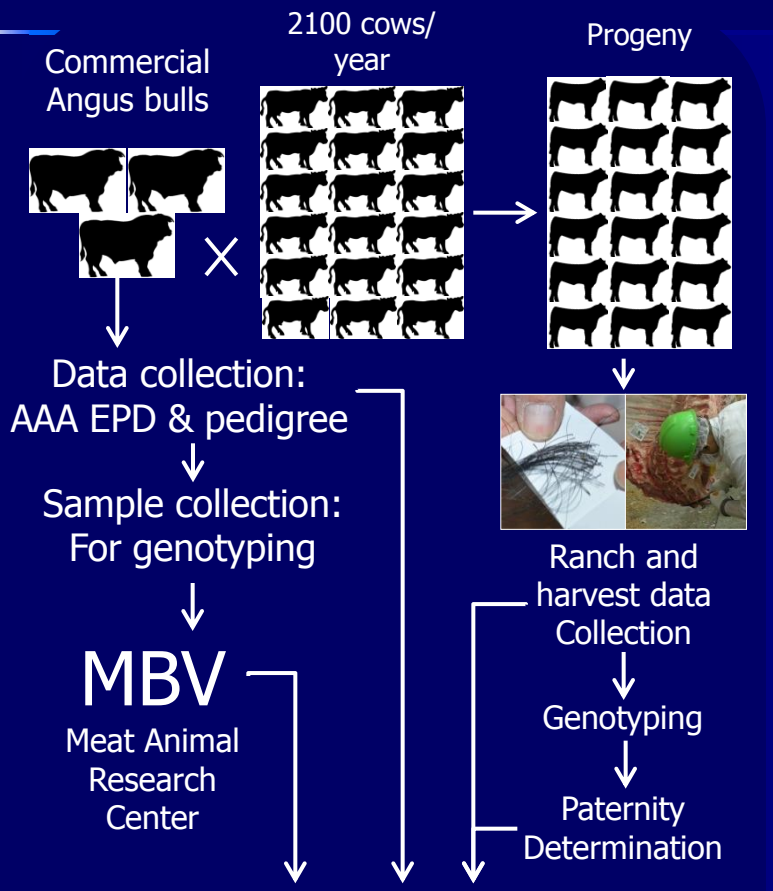
UCDAVIS ANIMAL SCIENCE



California Commercial Ranch Project



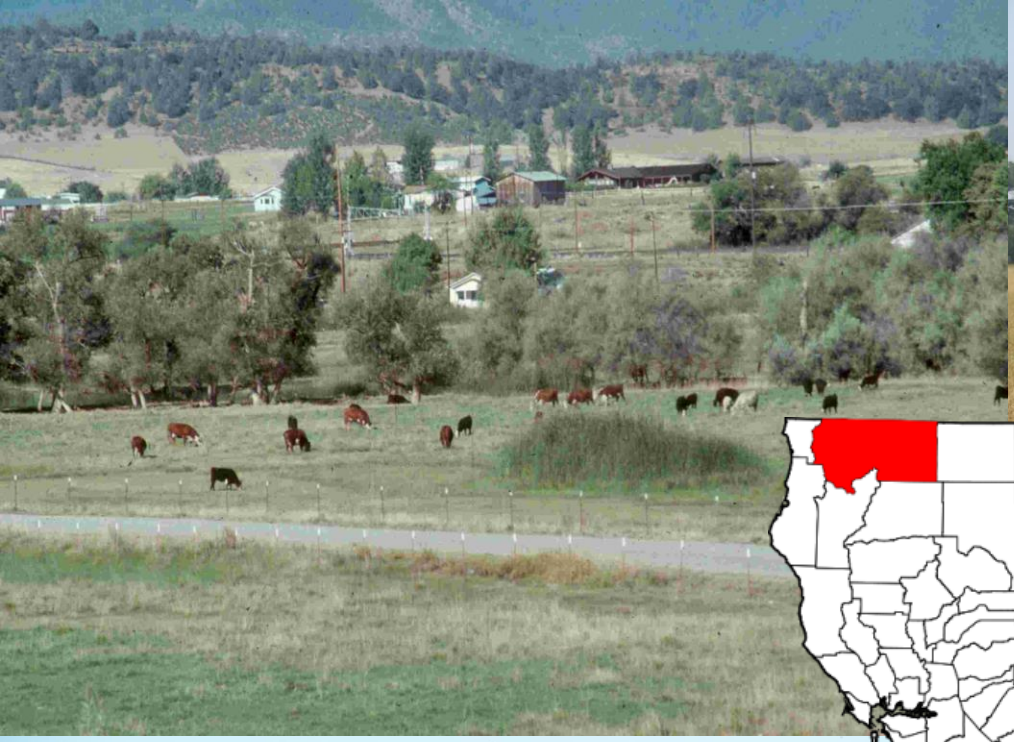
Three ranches:

- Cowley (900 cows)
- Kuck (500 cows)
- Mole-Richardson (700 cows)

Approximately 150 Angus bulls, and 6000 calves on project

USDA NIFA

United States Department of Agriculture
National Institute of Food and Agriculture



Cowley Ranch

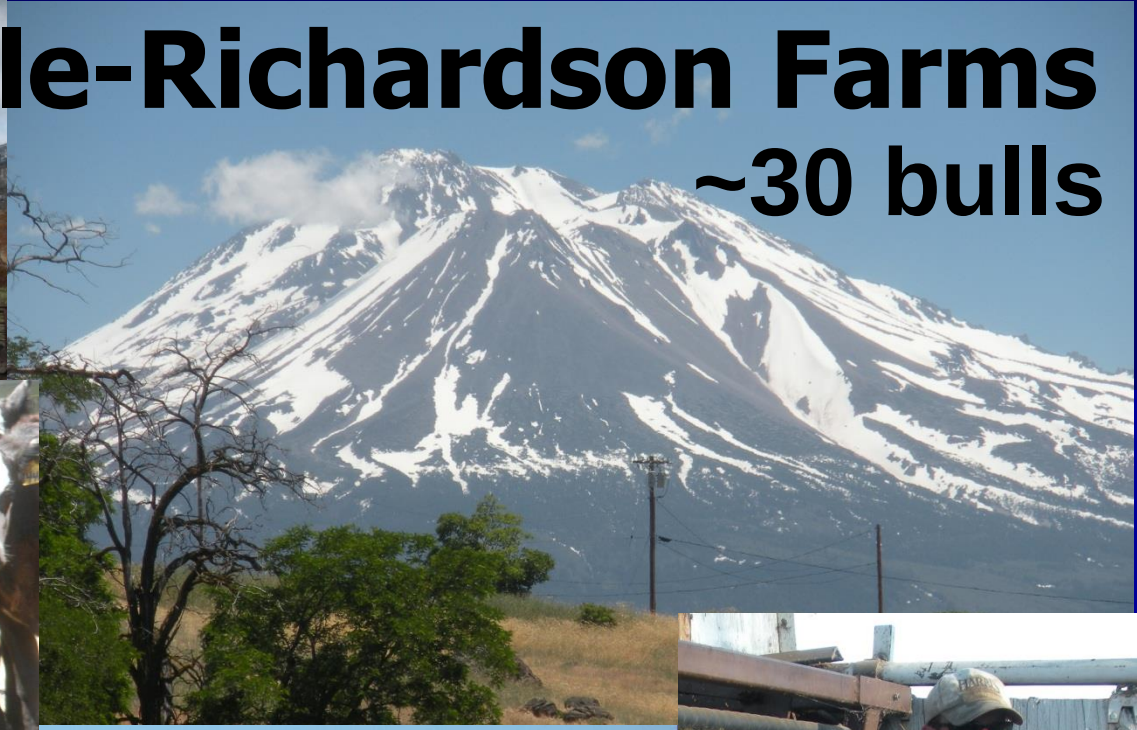
~20 bulls/season

Kuck Ranch

~10 bulls/season

Mole-Richardson Farms

~30 bulls

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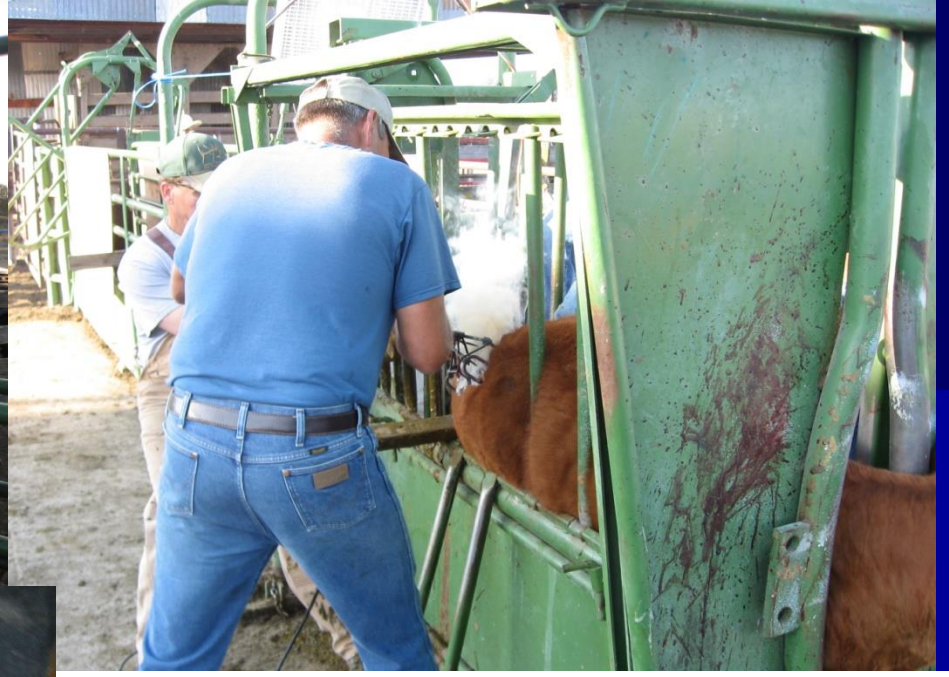
Cooperating ranchers were key to success of this project

- Need to test new technologies to see how they work under practical conditions
- Inadequate research on field application of new technologies
- Cooperating ranches make a substantial contribution of time, labor and expenses

We had occasional trouble capturing electronic weights



Technology Tools Learnings
EIDs, electronic scales, computers, handhelds, DNA sampling, genotyping

- Technology problems were constant but declined as we obtained experience
- Each additional piece of equipment exponentially increased problems
- Background knowledge and expertise in computing level for troubleshooting was very high
- Electronics were remarkably durable
- Record keeping was an important attribute to make this project work


HARRIS
RANCH
Honest
to Goodness Beef
16277 S. McCall Ave.

Despite our best efforts…

- In five consecutive Ranch A calf cohorts, the carcass misidentification rate in the processing plant ranged from 3.5 to 19.3%, with an average misidentification rate of 10.8%
- Paternity assignment of sampled calves using a 99 SNP panel was very high (98%)
- For a variety of practical reasons DNA samples were not collected on 9.4% of the progeny with birth records. These considerations may influence whole herd results in commercial settings.

Work flow and collaborators

- DNA on all bulls goes for whole genome scan – collaboration with Jerry Taylor (MO) and John Pollak (MARC)
- Molecular breeding value (MBV) prediction of genetic merit based on MARC training data set – collaboration with Dorian Garrick (IA), Taylor (MO), and U.S. Meat Animal Research Center (NE)
- Ranch data including sire groupings, birth dates and weaning weights on all calves, all EIDed, and "DNAed" for parentage determination – collaboration with Dan Drake and producers
- Steer feedlot in weights, treatments, and carcass traits, weight, grading information and meat sample collected in the processing plant – collaboration with Harris Ranch (CA)
- Compile data and compare three sources of genetic estimates: breed EPDs (bEPDs), commercial ranch EPDs (rEPDs), and MBVs

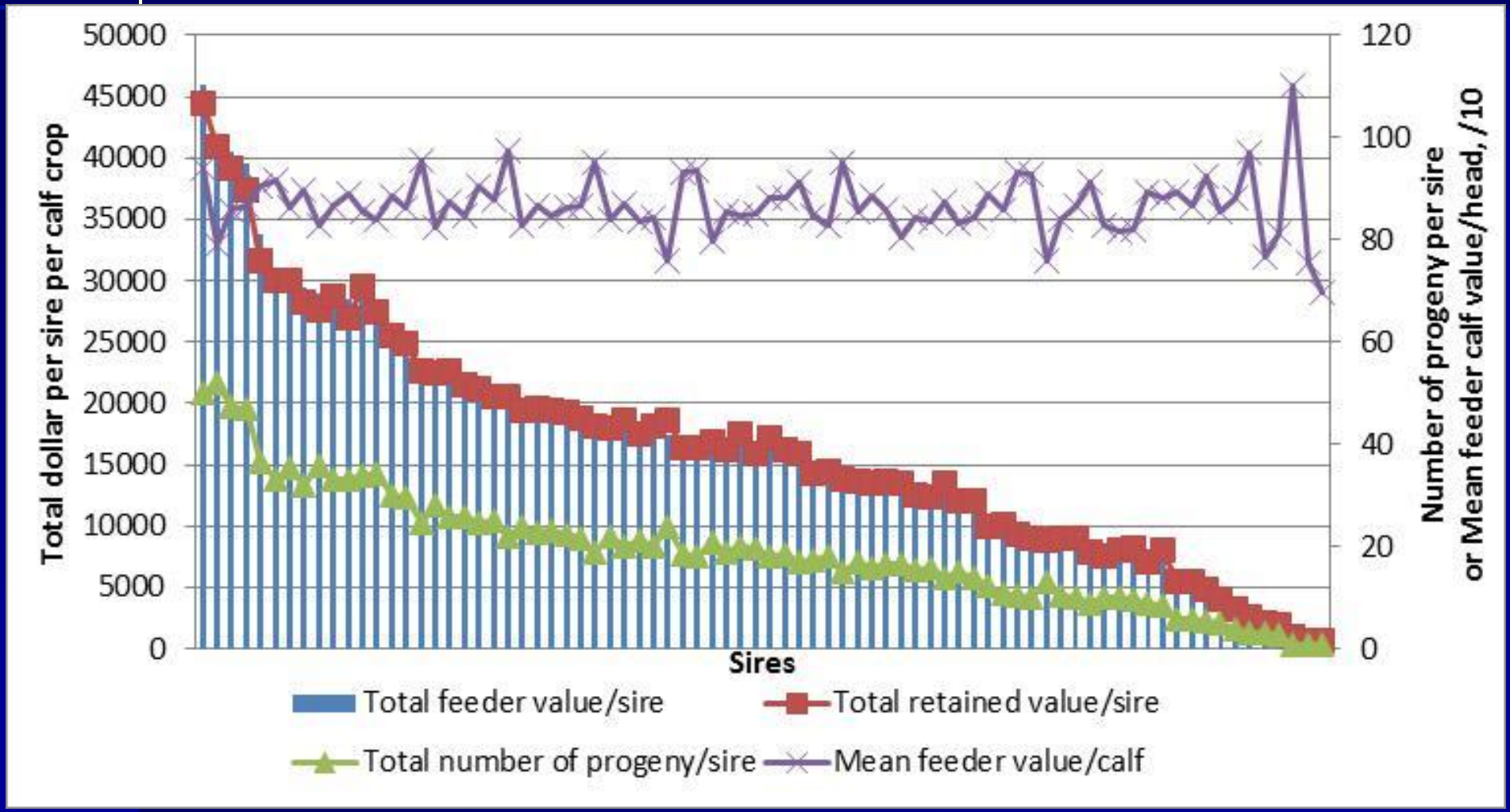
Kristina Weber, PhD student with occasional guidance from PI

Number of calves per bull

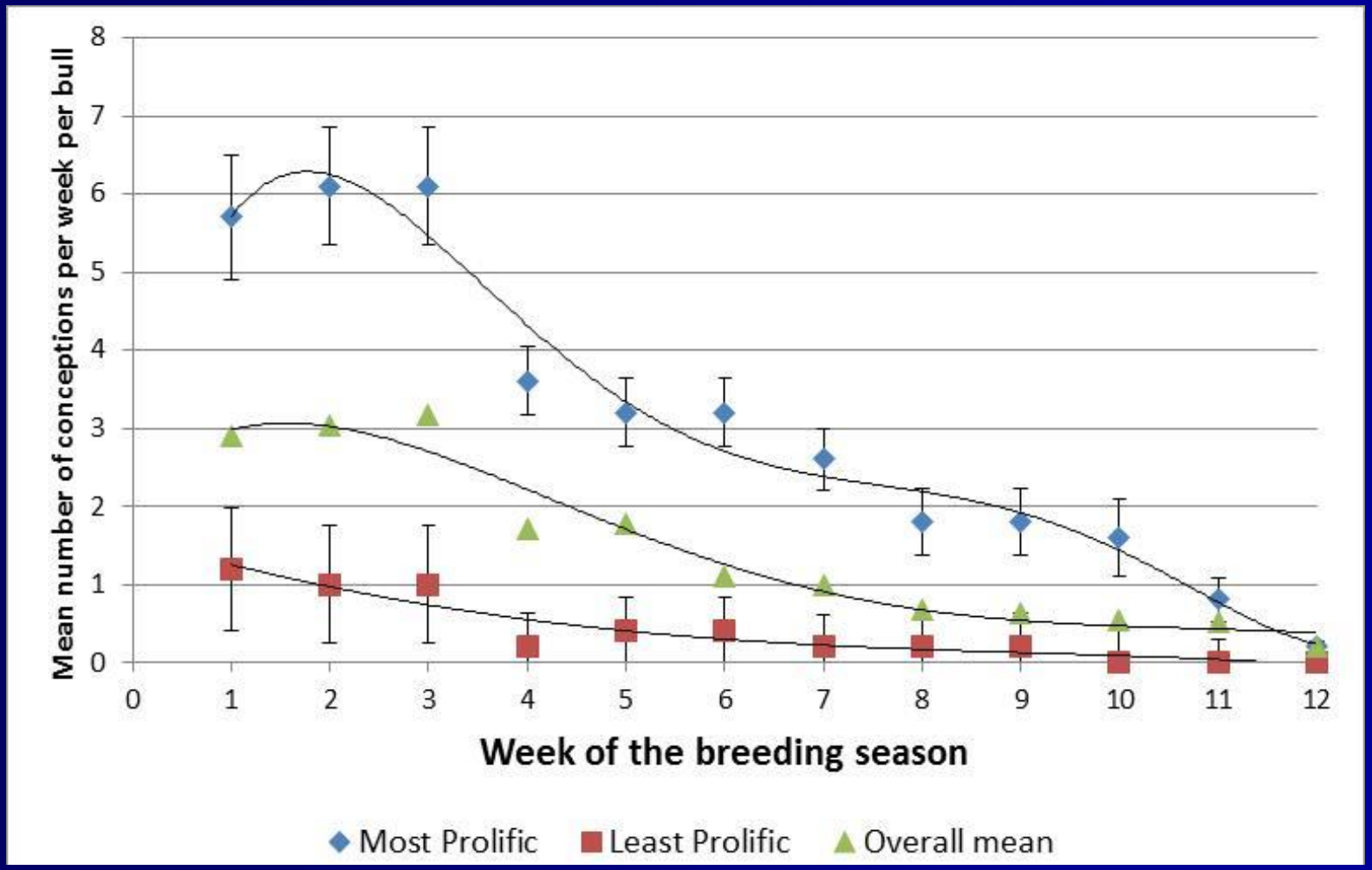
Ranch	Year	Season	# Bulls/ season	Mean bull age (± SD)	Total # calves	Per bull		
						Min # calves	Max # calves	Mean # calves (± SD)
A	2009	Spring	18	3.8 ± 1.2	353	3	47	19.6 ± 13.4
A		Fall	19	4.7 ± 0.8	113	1	29	16.1 ± 10.0
A	2010	Spring	22	3.6 ± 0.9	346	1	47	18.2 ± 14.2
A		Fall	19	4.5 ± 1.0	328	1	48	17.3 ± 12.6
A	2011	Spring	17	3.9 ± 1.1	402	4	53	23.6 ± 13.6
A		Fall	19	5.4 ± 0.7	286	1	33	15.0 ± 9.2
B	2009	Spring	8	4.6 ± 3	141	1	45	17.6 ± 17.0
B		Fall	10	5.1 ± 2.5	214	10	50	21.4 ± 11.4
B	2010	Spring	8	3.4 ± 1.4	142	3	30	17.8 ± 8.4
B		Fall	12	5.1 ± 2.7	247	4	44	20.5 ± 11.4
B	2011	Spring	4	4.6 ± 1.7	110	18	42	27.5 ± 11.0
B		Fall	12	5.3 ± 2.9	266	3	51	22.2 ± 15.2
C	2009	Fall	30	4.2 ± 1.1	642	2	54	21.4 ± 13.8
C	2010	Fall	27	4.6 ± 1.3	567	1	52	21.0 ± 13.0
C	2011	Fall	38	5.4 ± 1.8	573	1	64	15.1 ± 16.1
A	2009-11	All	114	4.0 ± .2	2150	1	53	18.8 ± 1.2
B	2009-11	All	54	4.8 ± .2	1120	1	51	20.8 ± 1.8
C	2009-11	All	95	4.8 ± .2	1782	1	64	18.7 ± 1.4
A,B,C	**2009-11**	**All**	**263**	**4.4 ± 1.7**	**5052**	**1**	**64**	**19.2 ± 13.3**

Additionally, 7.3% sires failed completely (i.e. no calves sired) in any given breeding season.

Total income as feeder calves per sire or total retained ownership varied by sire (Total dollar per sire per calf crop, left axis), and the number of progeny per sire (right axis) and the mean individual feeder value/calf (right axis, $/10)



Conceptions per week were greater (P<.02) during each week of the breeding season for the first 10 weeks of the breeding seasons for the two most prolific bulls (from each calf crop) compared to the least prolific bulls.



EBVs, prolificacy and total income.

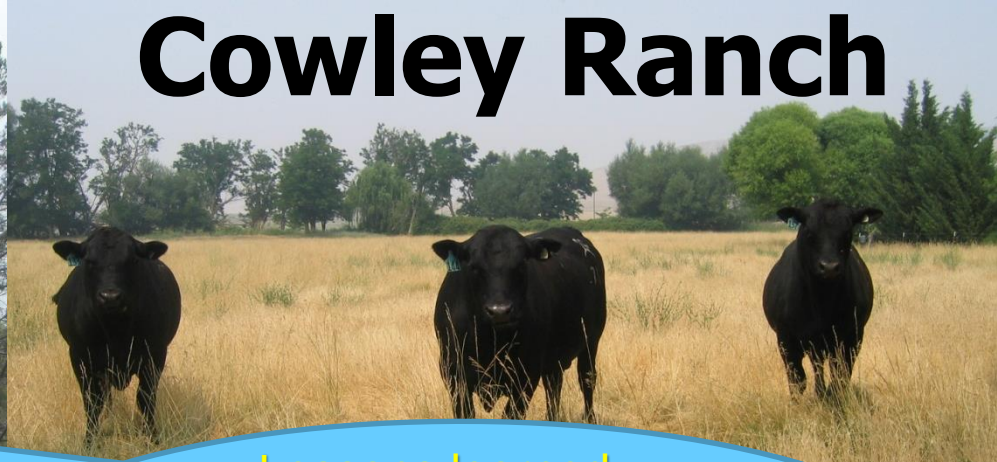
- Repeatability of prolificacy for full season bulls with data for more than one breeding season was 0.43 (±0.08).
- Scrotal circumference (SC) EBV was positively related to prolificacy ($P<0.01$).
- Approximately 5% of the total variation in sire prolificacy was explained by SC EBV.
- The calves that were sired by South Devon (n=217) and Hereford (n=145) bulls were on average 20.4 kg and 16.4 kg heavier than Angus-sired calves at weaning
- Irrespective of hybrid vigor (heterosis), prolificacy was the main driver of total calf weight weaned per sire.

Summary and practical implications

- The number of calves born per sire per calf crop varied from 0 to 64.
- Prolificacy was by far the main driver of total weight weaned per sire. The total adjusted 205d weight per bull per calf crop was related (P<.01) to the number of calves (220±1.8 kg increase for each calf) explaining 98 percent of the variation in sire weight weaned per calf crop , and showed little correlation with mean adjusted progeny weaning weight per sire.
- Scrotal circumference (SC) was positively correlated with herd sire prolificacy (# of calves), and both total feeder calf & retained ownership value per sire.
- These data suggest inclusion of SC EPDs might be useful as selection criteria in commercial herd sire selection, & emphasize the importance of management approaches to increase the proportion of calves born in the first 21 or at most 42 days of the calving season
- Commercial ranch evaluations using natural service sires frequently have too few offspring due to variations in prolificacy to give an accurate evaluation
- The accuracy of MBVs was inflated in this commercial ranch population

CHANGES IN BEHAVIOUR?

Cowley Ranch



Lessons learned:

1. Fertility is all important
2. More attention to detail: better records
3. Better way of selecting bulls for servicing cows

~20 bulls/season

FARMER UPTAKE?

Thanks again for the project. I truly think it was very beneficial and of course in areas not expected. I recently read somewhere that you are working on a DNA project regarding BRD. Just curious, would you be able to take the DNA panels taken from out set of calves and use that in your study? Just thought I would ask


Happy
California
Cow

Questions?

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