Simulating the profitability of sexed-semen use in hill country beef production systems

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Background

- Male sexed beef semen has recently become commercially available
- Male cattle grow faster than females, with higher per head sale value
- NZ beef herds cows are typically naturally bred with bulls; AI (artificial insemination) has limitations due to cost and practicality.
- Currently there is a lack of economic analysis of the impact of using sexed semen in a NZ beef herd

Objective

- Investigate the profitability of using sexed semen via fixed time AI for a New Zealand hill country beef cow herd

Methods –System

- Class 4 East Coast North Island Hill Country
- Beef enterprise: 40% of feed supply which limits cow herd size
- Selling cattle prime (direct to slaughter) and/or store (to another farmer below slaughter weight)
- Weaning rate of 84%; maiden calving at two years old

Methods – Model

- Bio-economic model developed in STELLA
  - Cow herd dynamics, feed demand, and economics

Methods – Base scenario

- Self-replacing Angus herd using Angus bulls
  - All offspring purebred Angus

Methods – Scenarios

- Cow herd
  - Self-replacing purebred Angus cows
  - Angus-Friesian cows with replacement heifers from dairy industry

Methods - Scenarios

Angus heifers

Angus MA cows

57% 43%

Angus

Simmental

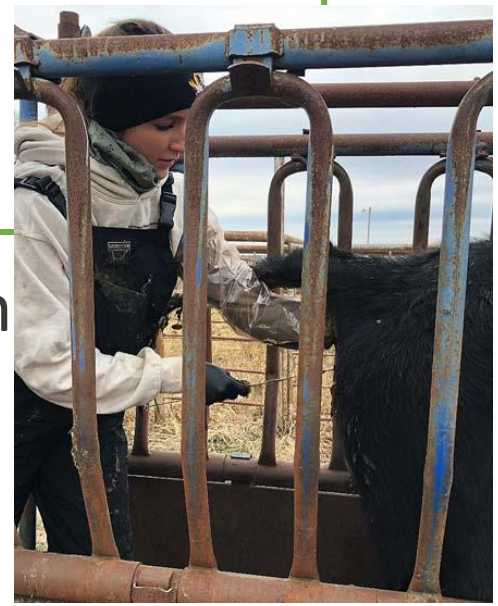
Angus-Friesian heifers

Angus

Angus-Friesian MA cows

Simmental

Methods – Breeding strategies



- AI: Unsexed Angus semen and male sexed Simmental semen
  - Pre-AI oestrus synchronization; three yardings total
  - Follow-up bulls
- Or only natural mating with bulls
- Both: Total herd conception rate of 92% with 56-day breeding period
- Assumed all sires are of above average genetic merit
- Average calving date 7 days earlier with fixed-time AI

Methods – Production & Economics

- Liveweight & carcass dressing out % varied with breed & sex & age
- Market values for cattle sales and enterprise costs
  - Cash operating surplus (COS) as profit indicator
- Bulls $11,500 for Angus, $9,500 for Simmental; kept for four years
- AI $96.70 with unsexed Angus & $110.08 with male sexed Simmental
  - $1,680 labour cost for additional yardings

Results – COS (cash operating surplus) Angus herd

AI & sexed semen	No	No	Yes	Yes
Sires	Angus	Angus & Simmental	Angus & Simmental	Angus & Simmental
Offspring sales	Prime & store	Prime & store	Prime & store	Store

Results – COS (cash operating surplus) Angus herd

AI & sexed semen	No	No	Yes	Yes
Sires	Angus	Angus & Simmental	Angus & Simmental	Angus & Simmental
Offspring sales	Prime & store	Prime & store	Prime & store	Store
Total income ($'000)	200	207	213	199
Breeding costs ($/cow)	102	89	158	144
Total costs ($'000)	144	140	155	162
COS ($/ha)	263	318	276	174

- Highest COS = $318/ha; shows benefit of using relatively cheap Simmental bulls for heavier offspring
- Using sexed semen could increase COS by 5% greater than base (to $276/ha), but higher breeding costs means COS lower than natural mating with Simmental
- Using sexed semen and selling all offspring store had the lowest COS

Results – COS (cash operating surplus) Angus-Friesian herd

AI & sexed semen	No	Yes	Yes
Sires	Angus & Simmental	Angus & Simmental	Angus & Simmental
Offspring sales	Prime & store	Prime & store	Store

Results – COS (cash operating surplus) Angus-Friesian herd

AI & sexed semen	No	Yes	Yes
Sires	Angus & Simmental	Angus & Simmental	Angus & Simmental
Offspring sales	Prime & store	Prime & store	Store
Total income ($'000)	253	255	271
Breeding costs ($/cow)	77	183	159
Total costs ($'000)	161	171	200
COS ($/ha)	434	400	333

- Highest COS = $434/ha using only natural mating
- The income of having heavier males did not compensate for the increased cost of AI and sexed semen compared with natural mating
- Higher COS of Angus-Friesian herd ($333-434/ha) than Angus herd ($174-318/ha)

Conclusions

- Male sexed semen via fixed-time AI incurred high breeding costs
  - Was not compensated for by higher income from heavier majority male offspring
- Higher COS from use of Simmental (large European) bull with natural mating compared with sexed semen and AI
- Need for economic analysis of access to higher genetic merit as well as sexed semen