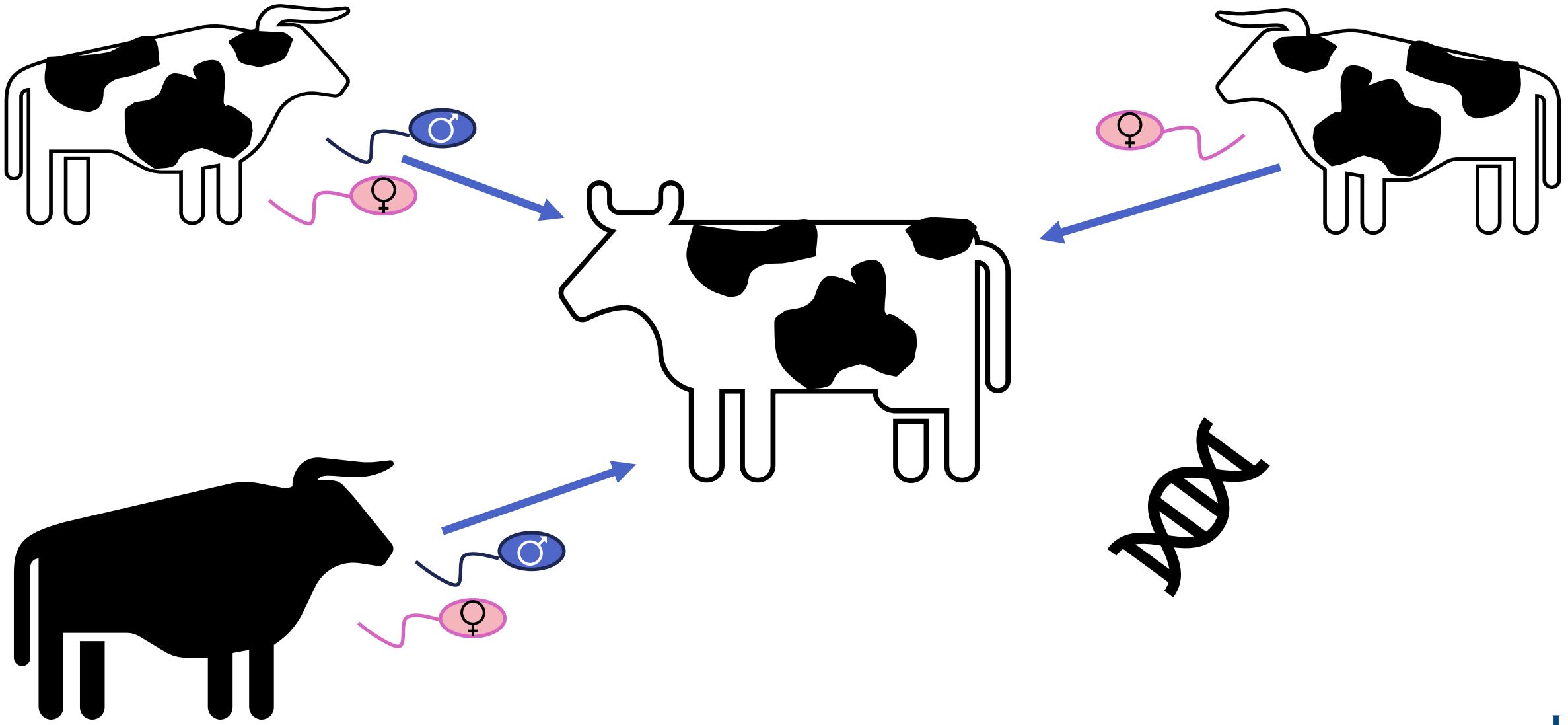
Quantifying the utilization and genetic benefits of advanced breeding programs within U.S. dairy herds

Bailey L. Basiel and Paul M. Vanraden

USDA Agricultural Research Service

Animal Genomics and Improvement Laboratory

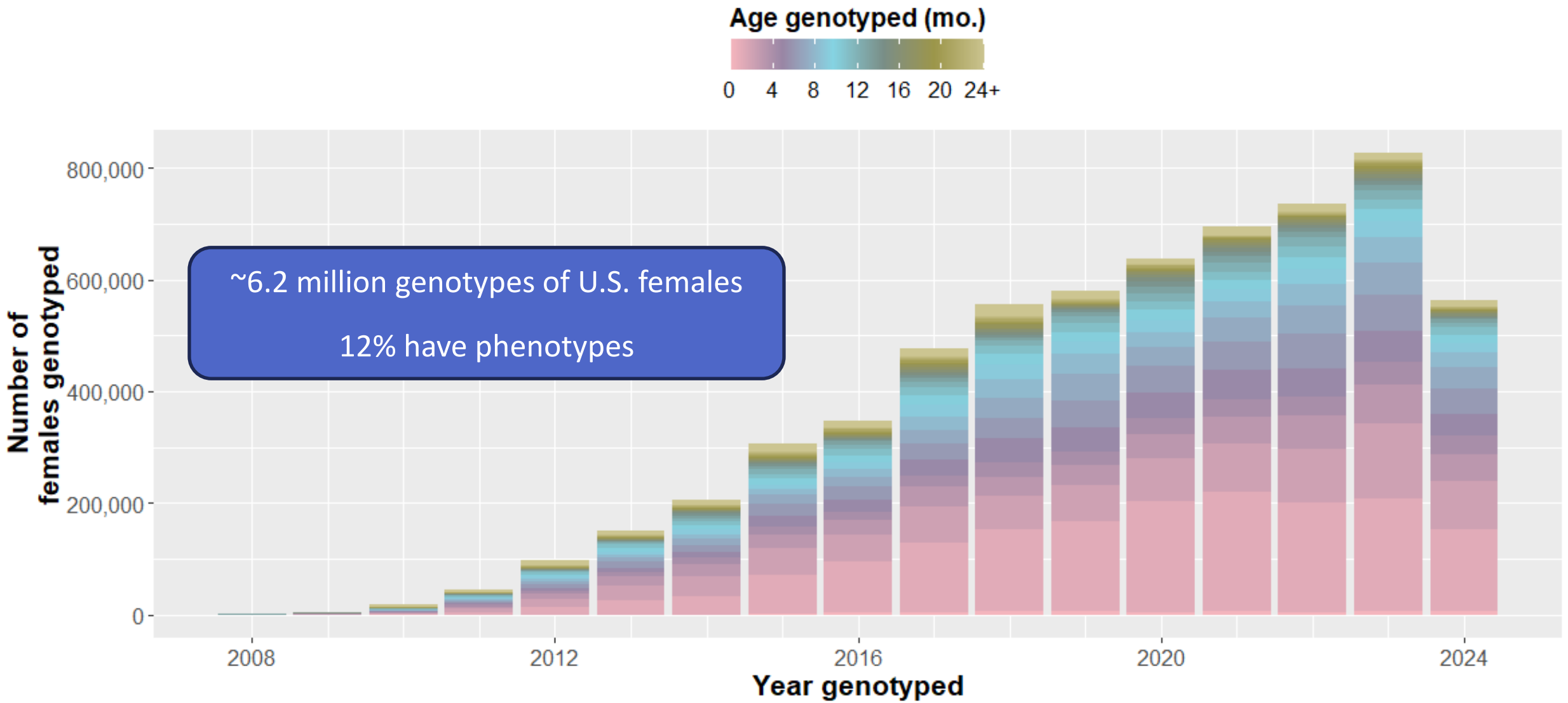
Background



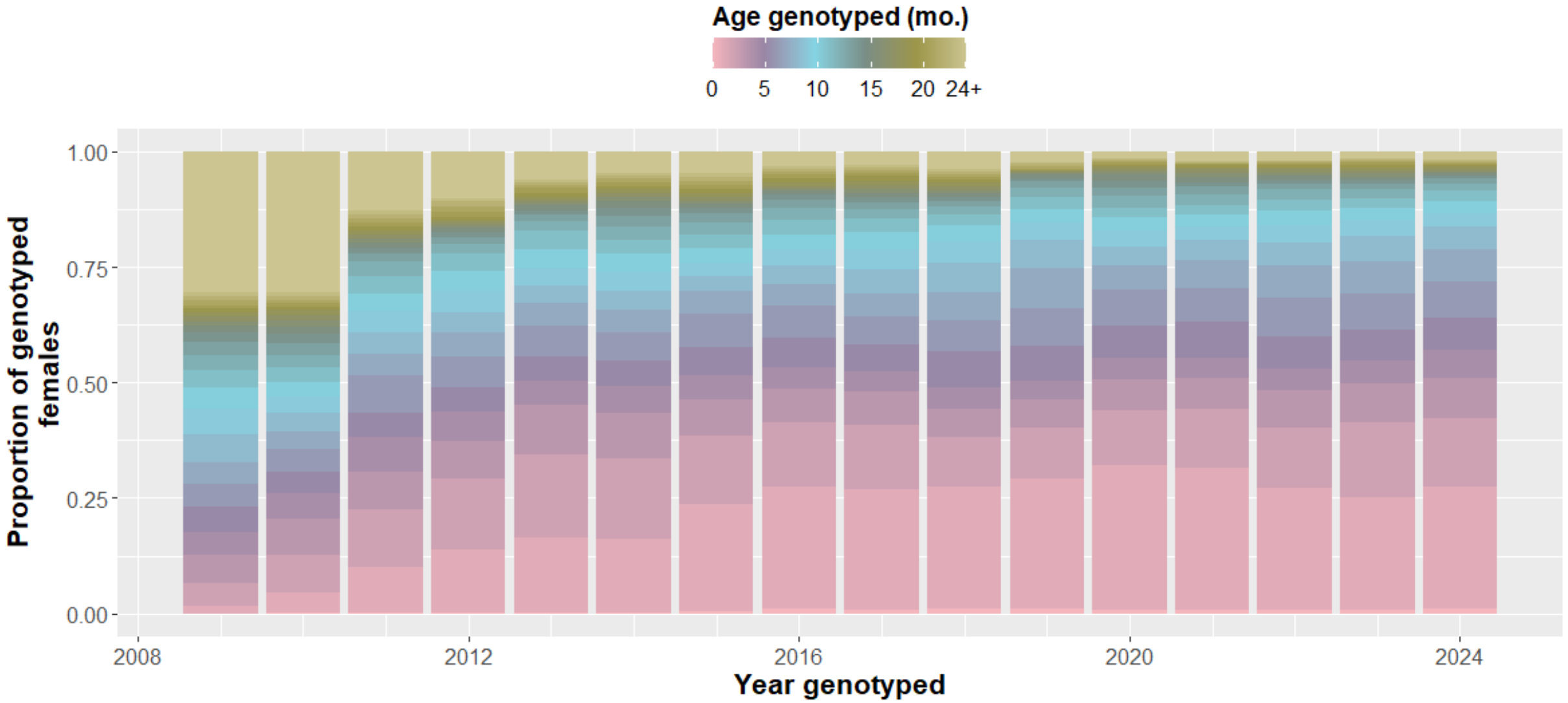
Objectives:

- Quantify the advanced breeding strategies utilized in U.S. dairy herds contributing to the National Cooperator Database
  - Heifer genotypes
  - Semen allocation
- Compare the genetic merit of calves born in HYs using different semen allocation strategies
- Compare the realized genetic benefits of breeding strategies herds are using to the potential benefits using optimized semen allocation

More U.S. heifers are GTd each year



Most GTd U.S. females are GTd by 6 mo. of age



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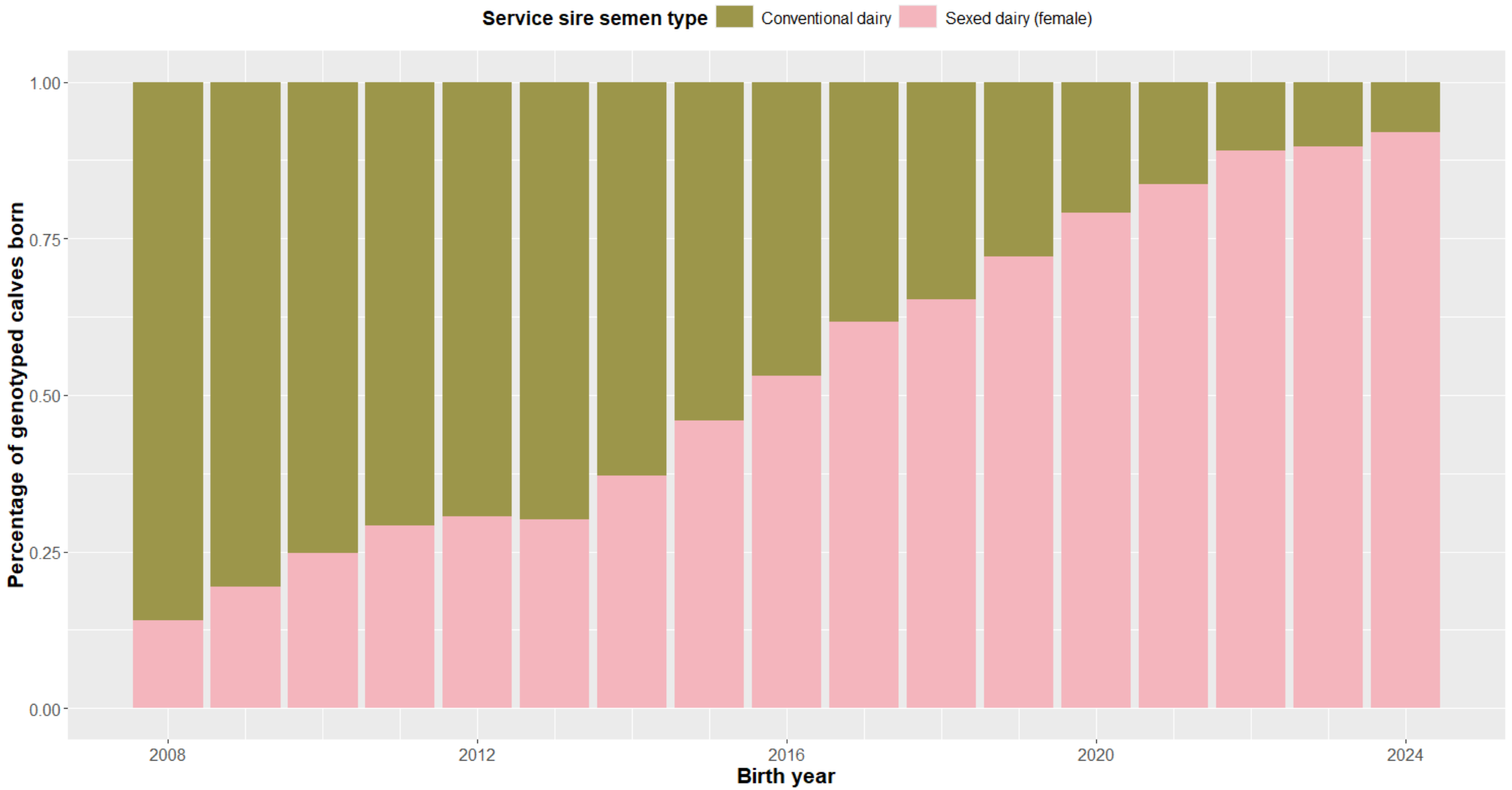
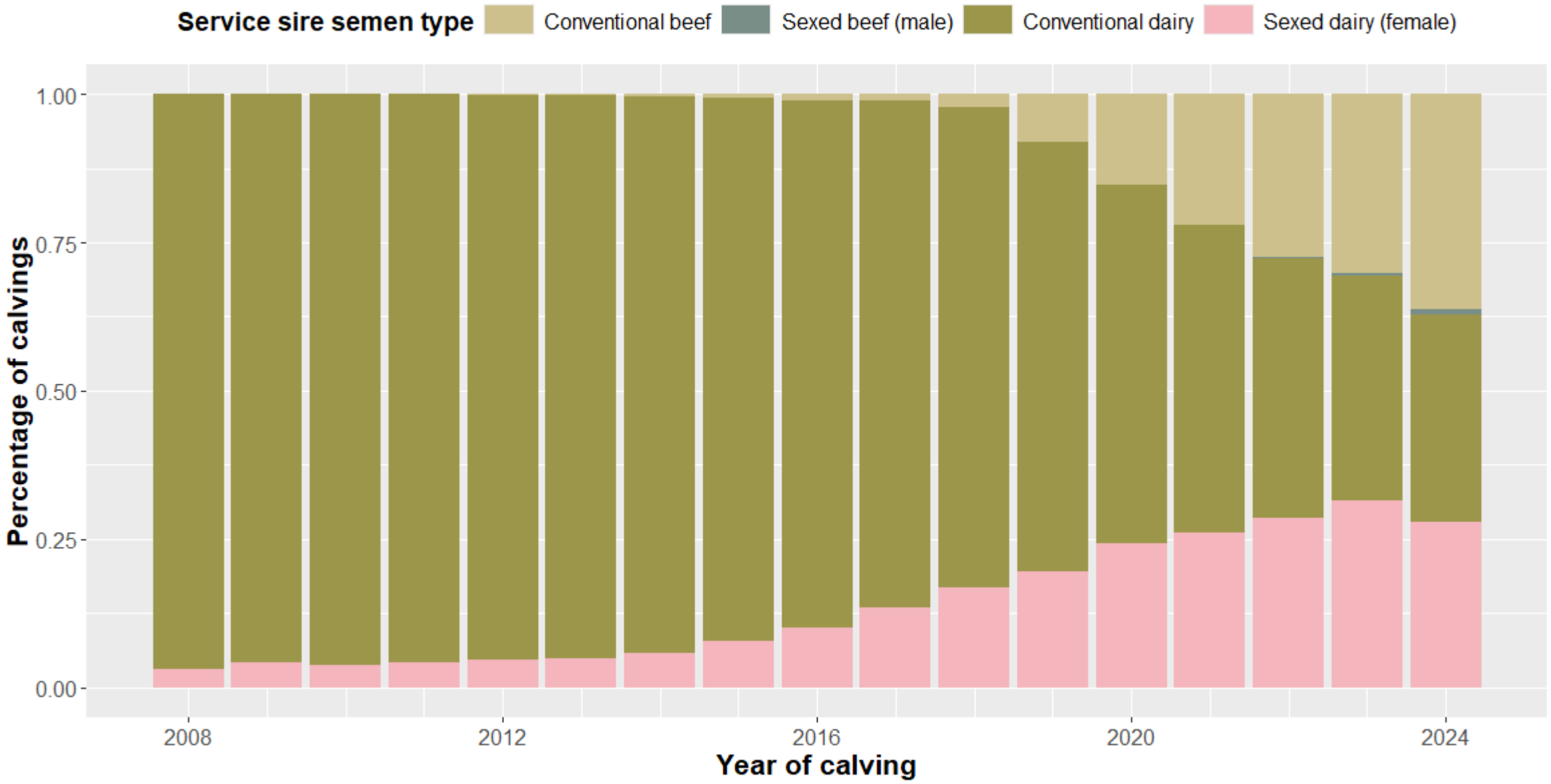
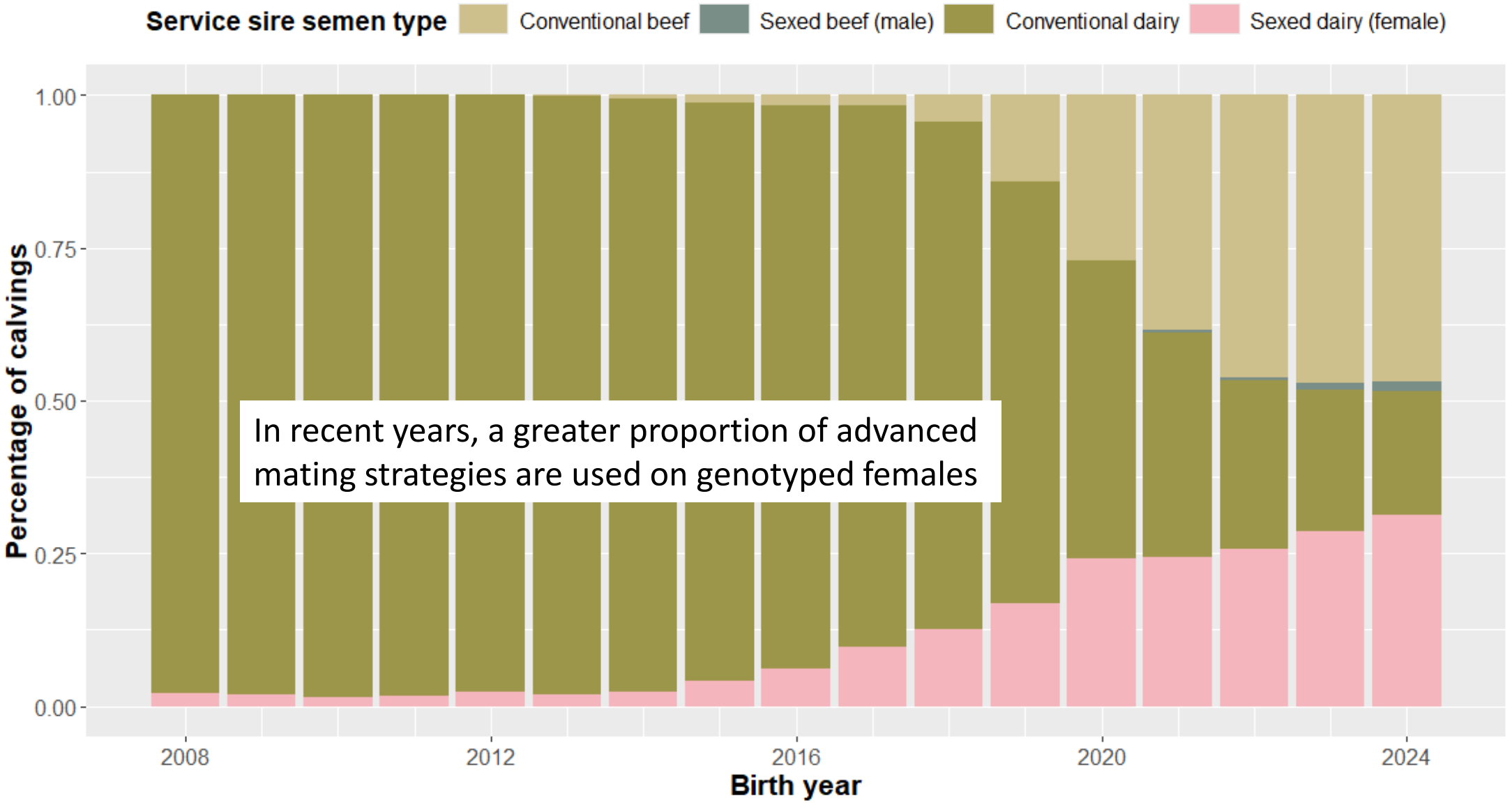
Most GTd heifers were conceived with sexed semen



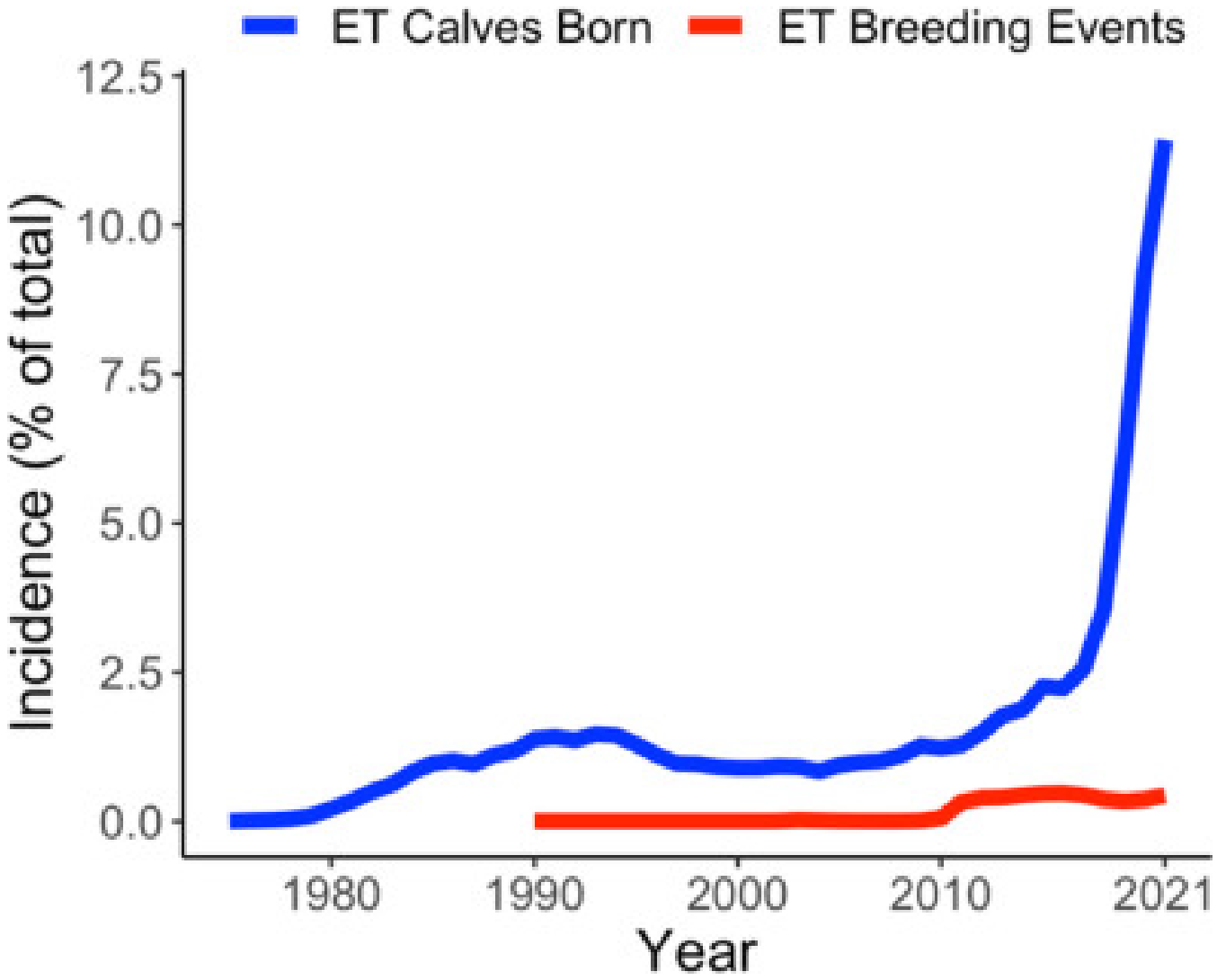
Proportion of annual calvings by mating type



Proportion of annual calvings to genotyped cows by mating type

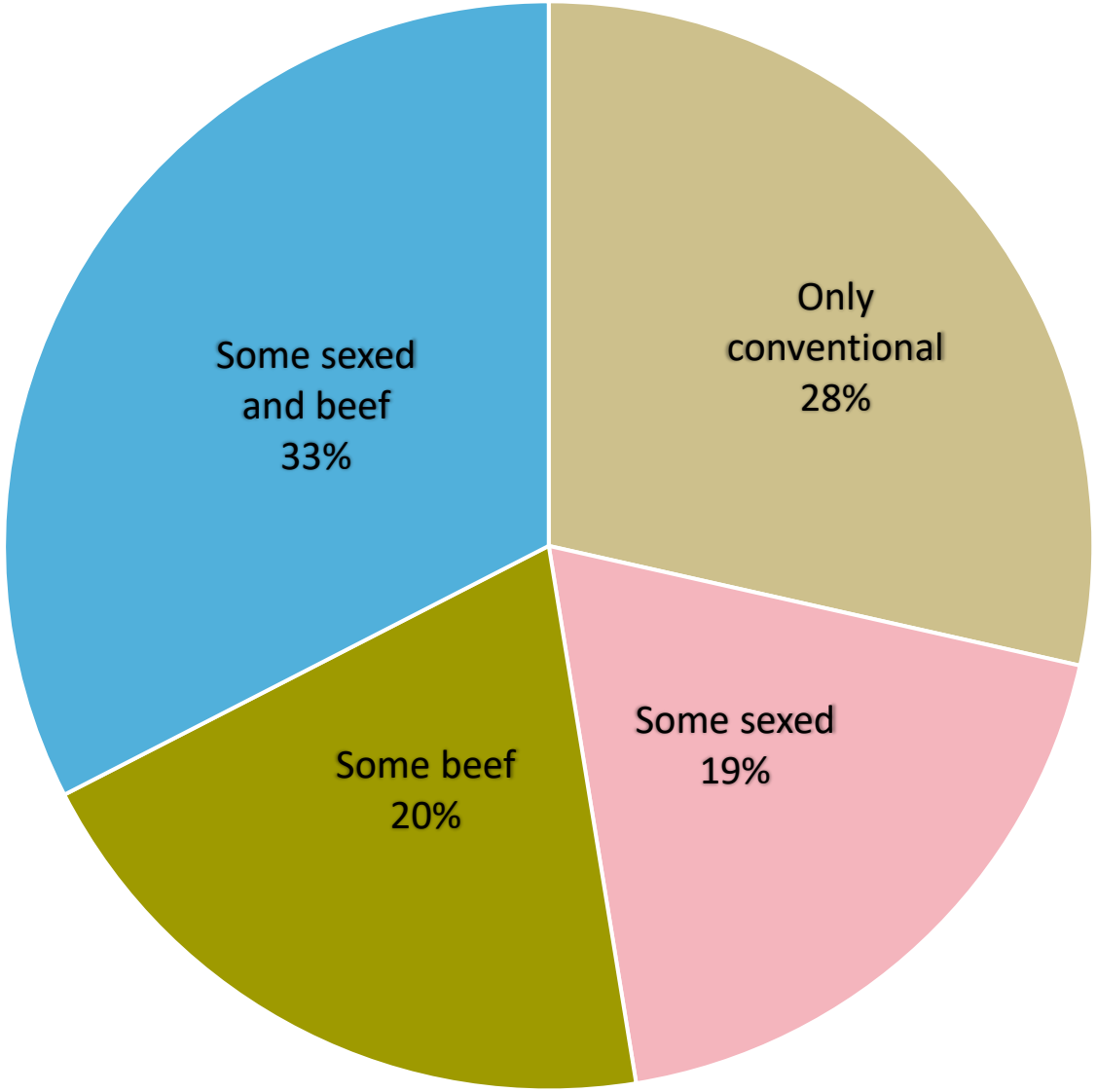


What's missing?



Miles et al., 2023

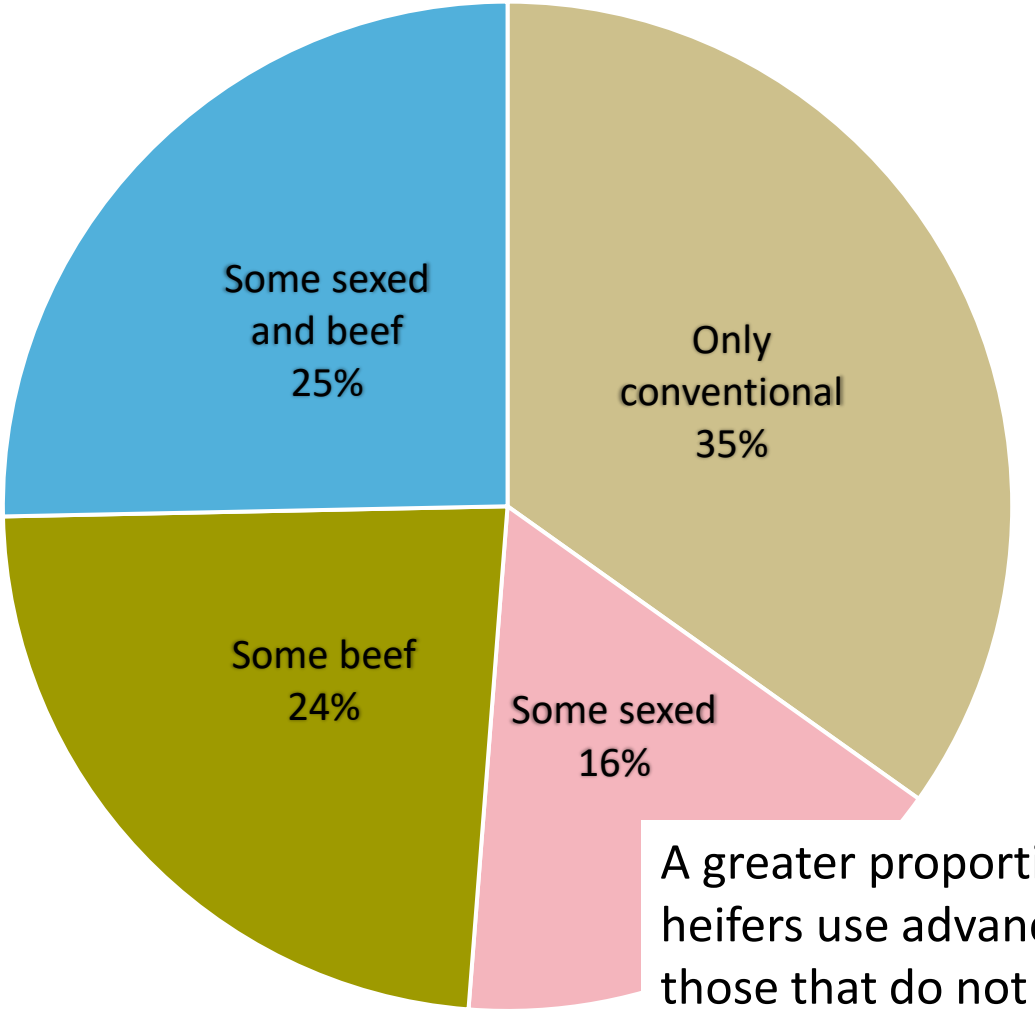
Mating strategies used in herd-years evaluated



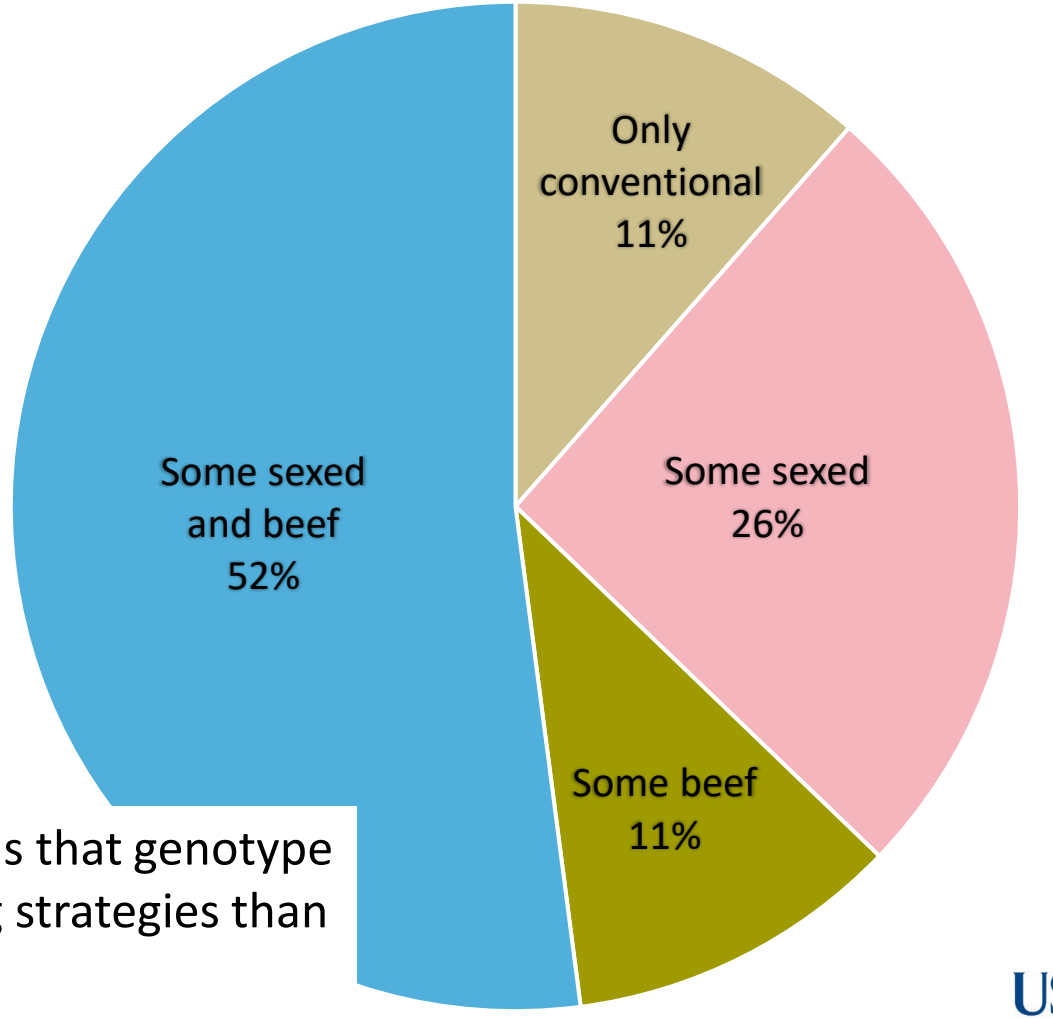
		Some sexed	Some beef	Some sexed & beef
Conventional	Mean	87%	89%	62%
	Min	0%	0%	0%
	Max	>99%	>99%	>99%
Sexed	Mean	13%	-	15%
	Min	<1%	-	<1%
	Max	100%	-	99%
Beef	Mean	-	11%	23%
	Min	-	<1%	<1%
	Max	-	100%	98%

Mating strategies used in herd-years evaluated

Mating strategies in HYs that did not genotype heifers (n = 11311)



Mating strategies in HYs that genotyped heifers (n = 4193)



A greater proportion of herds that genotype heifers use advanced mating strategies than those that do not genotype

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PTAs of heifer calves born in 2021 by herd mating strategy

PTA	Only conventional	Some sexed	Some beef	Some sexed and beef
n calves	16,345	17,946	33,941	201,134
NM$	327	360	416	446
Milk	583	578	717	663
Fat	32	36	40	43
Protein	23	25	29	29
PL	16	19	20	24
DPR	-7	-7	-6	-5
HCR	4	6	5	7
CCR	-3	-2	-1	1

PTAs of heifer calves born in 2021 by herd mating strategy

PTA	Only conventional	Some sexed	Some beef	Some sexed and beef	Some sexed and beef *and* GTd heifers
n calves	16,345	17,946	33,941	201,134	99,225
NM$	327	360	416	446	466
Milk	583	578	717	663	694
Fat	32	36	40	43	44
Protein	23	25	29	29	30
PL	16	19	20	24	26
DPR	-7	-7	-6	-5	-6
HCR	4	6	5	7	8
CCR	-3	-2	-1	1	0

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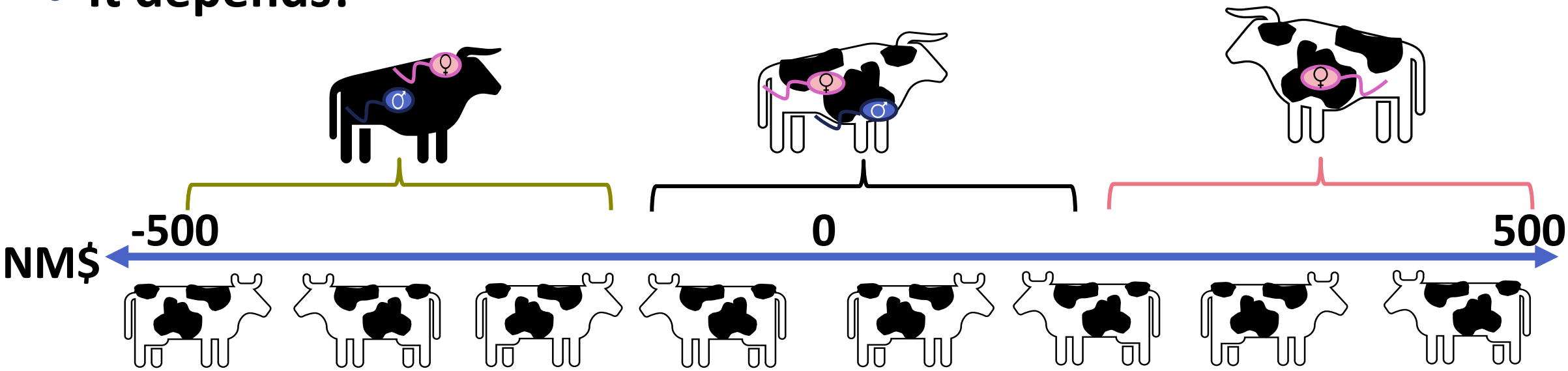
What is optimal?

- It depends!



- Farms that genomic test have more to gain (and lose!) (De Vries, 2020)
- Impacted by dairy heifer prices (McCullock et al., 2013; Ettema et al., 2017)

Thanks! Questions?

Bailey L. Basiel
ORISE Postdoctoral Fellow
Animal Genomics and Improvement Laboratory
Email: bailey.basiel@usda.gov