

# Curve linear weighting of litter size in the Norwegian Total Merit Index

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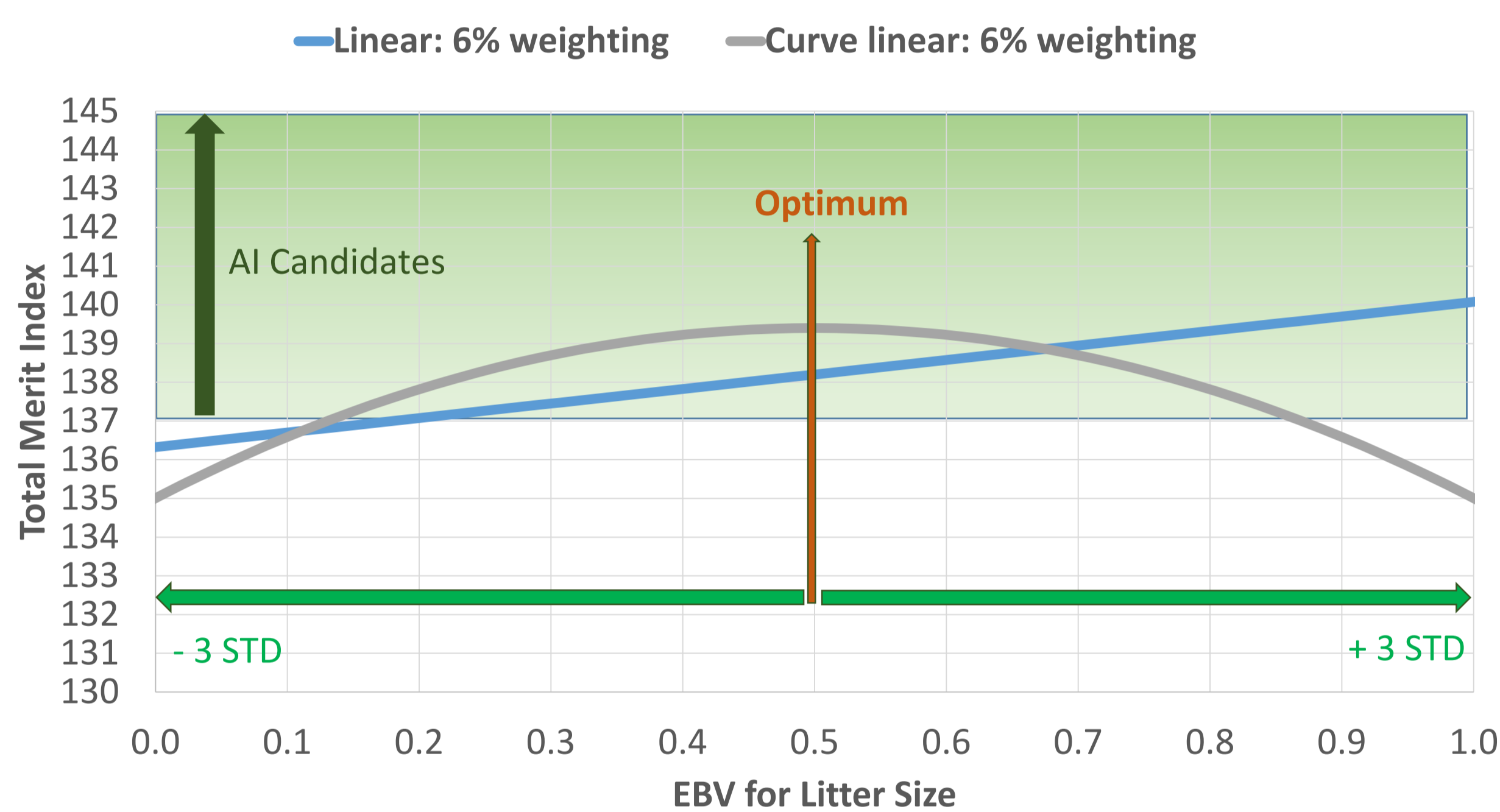
## Take home message – litter size is high enough

- ✓ In Norway, many lambs born give a higher income and net return per ewe
- ✓ Importation of Finnsheep to increase prolificacy in Norwegian White Sheep (NWS)
- ✓ In NWS, litter size has increased from 2.20 in 2006 to 2.33 in 2016
- ✓ Actions to stabilize genetic trend in litter size and to reduce the variation
  1. Reduce allele frequency of the mutation in the GDF9 gene (from Finnsheep)
  2. Reduce linear weighting on LS in the Total Merit Index (2009: 23% → 2016: 3%)
  3. Curve linear weighting of litter size in the Total Merit Index (2017: 6%)



## Weighting of litter size in the Total Merit Index

Example: Total Merit Index for AI candidates with equal EBVs for all traits except litter size

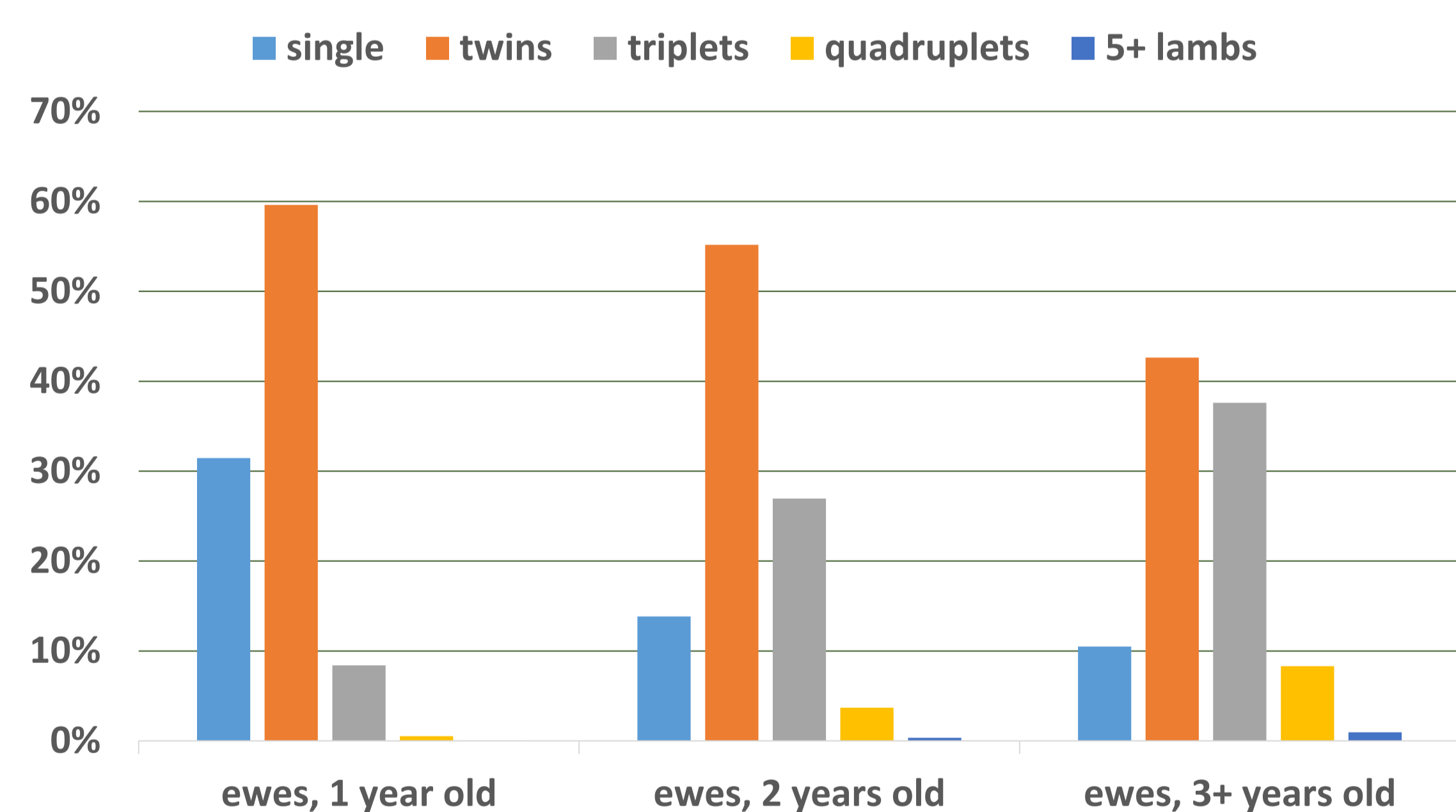


- ✓ No further increase in litter size (LS) in NWS is desirable
- ✓ Linear weighting of LS in the Total Merit Index (TMI) favours rams with high breeding values for LS
- ✓ Implementation of curve linear weighting of LS in the TMI
- ✓ Optimum set at the current genetic level
- ✓ The larger the deviation from optimum, the larger the penalty
- ✓ AI rams are selected based on their TMI. Rams with too large deviation from optimum EBV for LS may no longer qualify

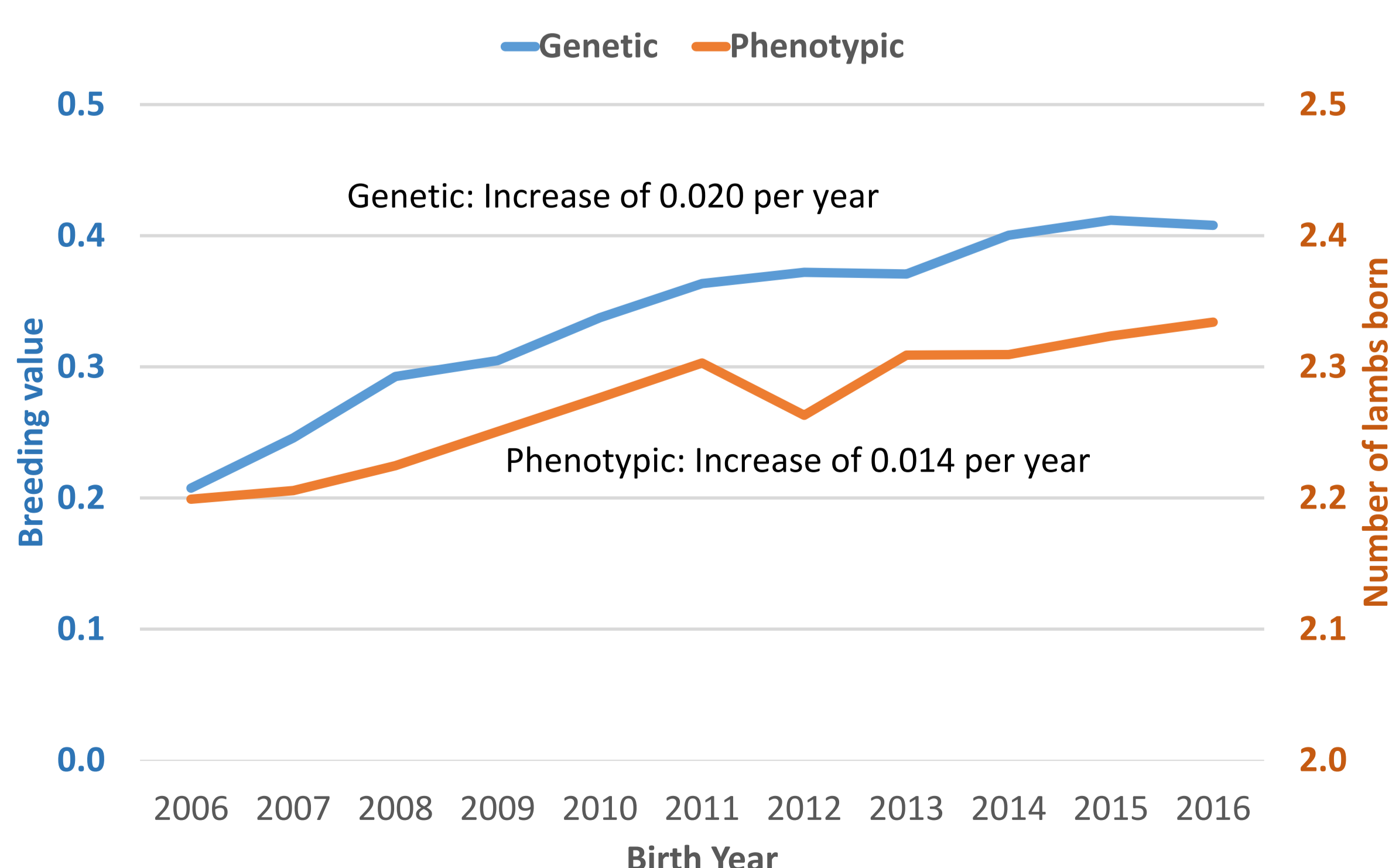
## Norwegian White Sheep: Breeding population 2017

Number of flocks	921
Total number of ewes lambed	86,000
Proportion of ewes lambing as 1 year old	80%
Average litter size	
1 year old ewes	1.85
2 year old ewes	2.30
3+ year old ewes	2.57

## Distribution of litter size by age of ewe



## Trend in litter size in breeding ewes



## Summary

- ✓ Increase in litter size during the last decade
  - Phenotypic: 0.014 lamb per year
  - Genetic: 0.020 lamb per year
- ✓ No further increase in average litter size in NWS is desirable, along with a reduction in number of large litters
- ✓ Weighting of litter size in the TMI was changed from a linear weighting to a curve linear weighting in 2017, favouring animals with an average EBV