



Farmer welfare and animal welfare

One Welfare 10.06.21

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Purpose of the presentation

- Show that farmer welfare and animal welfare are associated
 - The point of departure: No-one becomes a farmer to torment animals
 - Case: Dairy farming in Norway
- Demonstrate how a combination of a statistical learning method and a multivariate method structural equation modeling (SEM) can be applied to get the most of data.

Background of the study

- Access to two different data sets
 1. A web-survey from Ruralis among 1200 dairy Norwegian dairy farmers with and without milking robot in autumn 2017- «The farmer, the family and the milking robot- a new everyday life».
 - Responserate 38 %
 - 54 % had milking robot, robot-farms over-represented



2. An animal welfare indicator calculated for each dairy herd in the Norwegian herd registry
- We asked ourselves: «Are these two data sets related, and if so, how?»



Survey items covering aspects of farmers' welfare

- Chose three aspects:
 - Working situation
 - Quality of life
 - Mental health
- In total 18 different statements on Likert scales 1-11, completely disagree to completely agree
- The merged data set contained 914 farms

The items

Quality of life

1. I have a flexible working day
2. I have an optimistic view about the future
3. I have sufficient time for family life
4. I have sufficient time for friends
5. I have good physical health
6. I have an income I can live well of

Working situation

7. I'm satisfied with my working day
8. I'm satisfied with my work safety
9. I'm satisfied with my work environment
10. As a farmer I work too much during weekends
11. I feel little appreciated as a farmer

Mental health

12. I feel I do not have enough time off the farm
 13. I've often been stressed due to work
 14. I've often felt lonely as a farmer
 15. I've often been concerned about the debt
 16. I've often been concerned about my health
 17. I've often felt weary
 18. I've often felt I do not cover all I should have done
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The animal welfare indicator (AWI)

- A single aggregated number per farm: Mean 101.5 and STD 10.6 in 2017
- Consists of several part-indicators collected from the Norwegian Herd Registry, covering different aspects of cow and young stock welfare
- Aspects included are:
 - Variation in milk yield between parities
 - Longevity and culling
 - Metabolism
 - Udder health
 - Fertility
 - Dehorning
 - Dead cows
 - Claw health and trimming
 - Growth and health of youngstock
 - Growth and health of calves
- The merged data set contained 914 farms

A well-known methodological challenge....

- Low correlations between the survey-items and the AWI, typically e.g. linear regression often fails
 1. Need a statistical selection method that learns slowly from the data and does not overfit

Item	Satisfied	Income	Optimism	Appreciated	Stressed	Weary	Lonely	AWI
Satisfied		.32***	.51***	.23***	-.28***	-.37***	-.34***	.07*
Income			.36***	.28***	-.20***	-.26***	-.21***	.10**
Optimism				.36***	-.22***	-.33***	-.38***	.13***
Appreciated					.21***	-.23***	-.32***	.09*
Stressed						.57***	.44***	-.04
Weary							.44***	-.01
Lonely								-.07*

p ≤ 0.05 p ≤ 0.01 ** p ≤ 0.001***

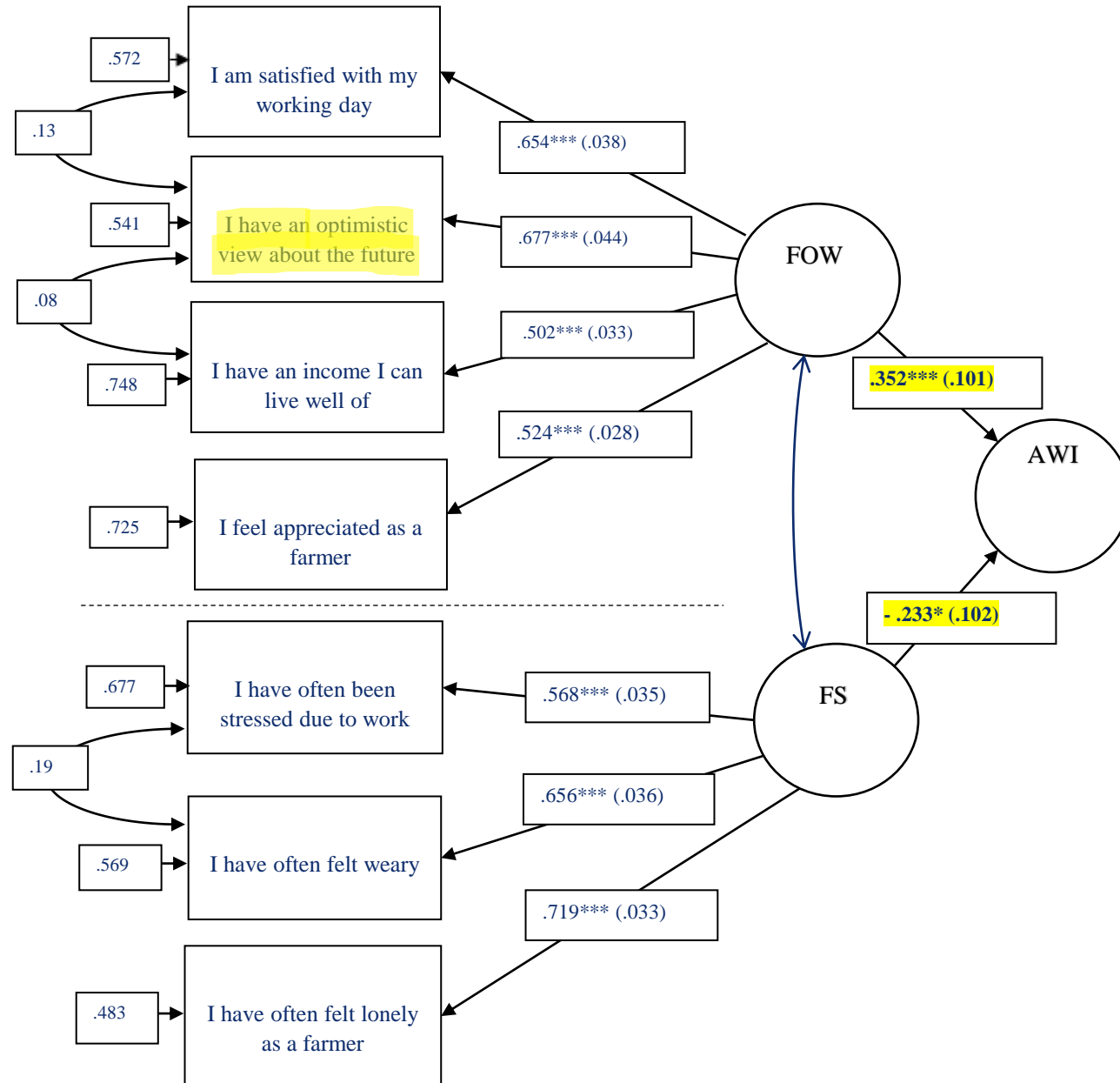
- Single items need to be grouped into concepts such as e.g. stress and occupational wellbeing.
 2. Need multivariate methods: Structural Equation Modeling (SEM) probably the most common one

Statistical methods used

- Paper I: SEM only, final model made by trial and error
- Paper II: Demonstrate a more efficient method:
 - First pre-conditioning the data with boosting to select the items most related to the AWI
 - Then use SEM to specify the model

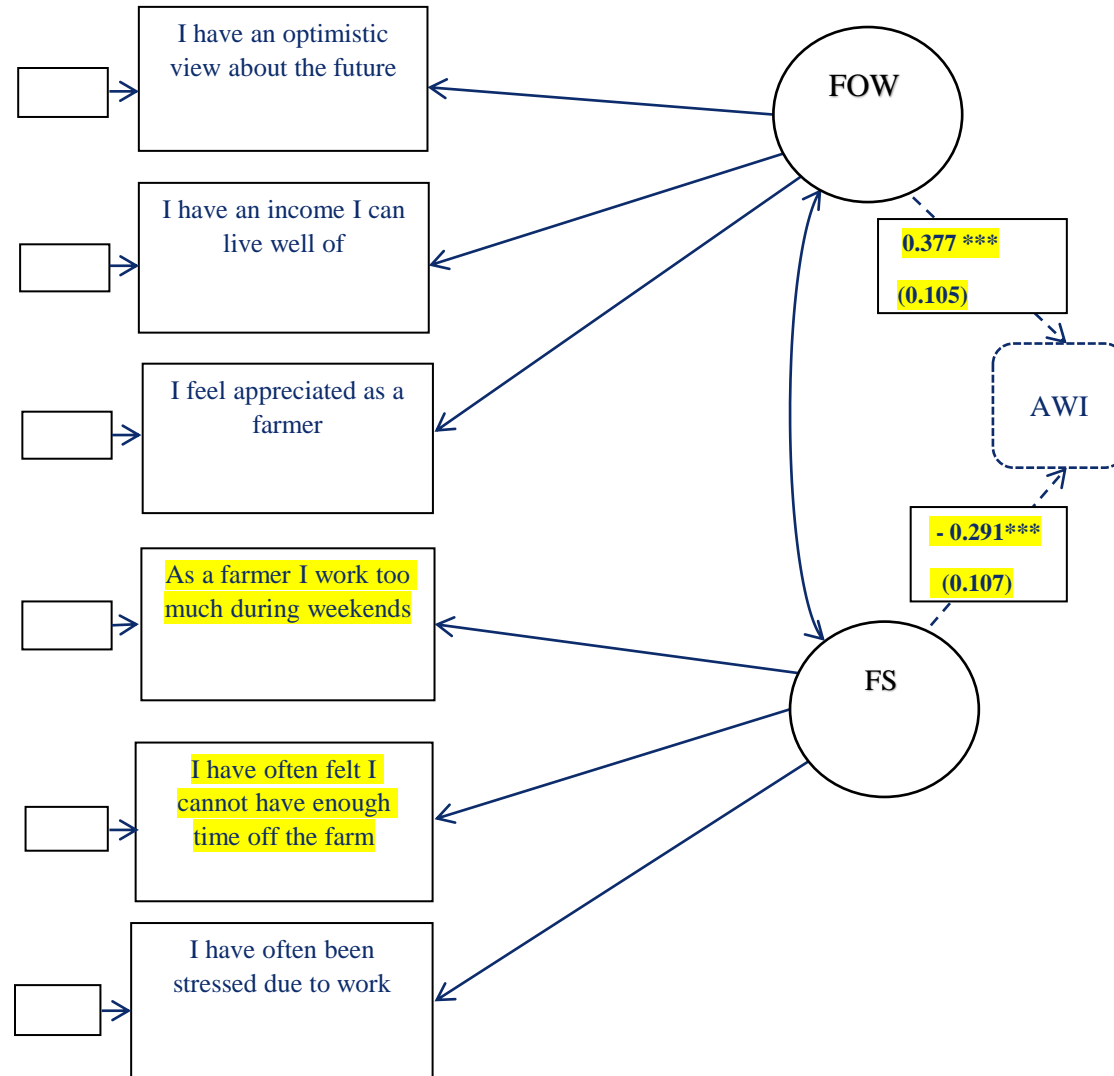
Results

- Model I paper I
- SEM by trial and error
- Good fit of the theoretical model



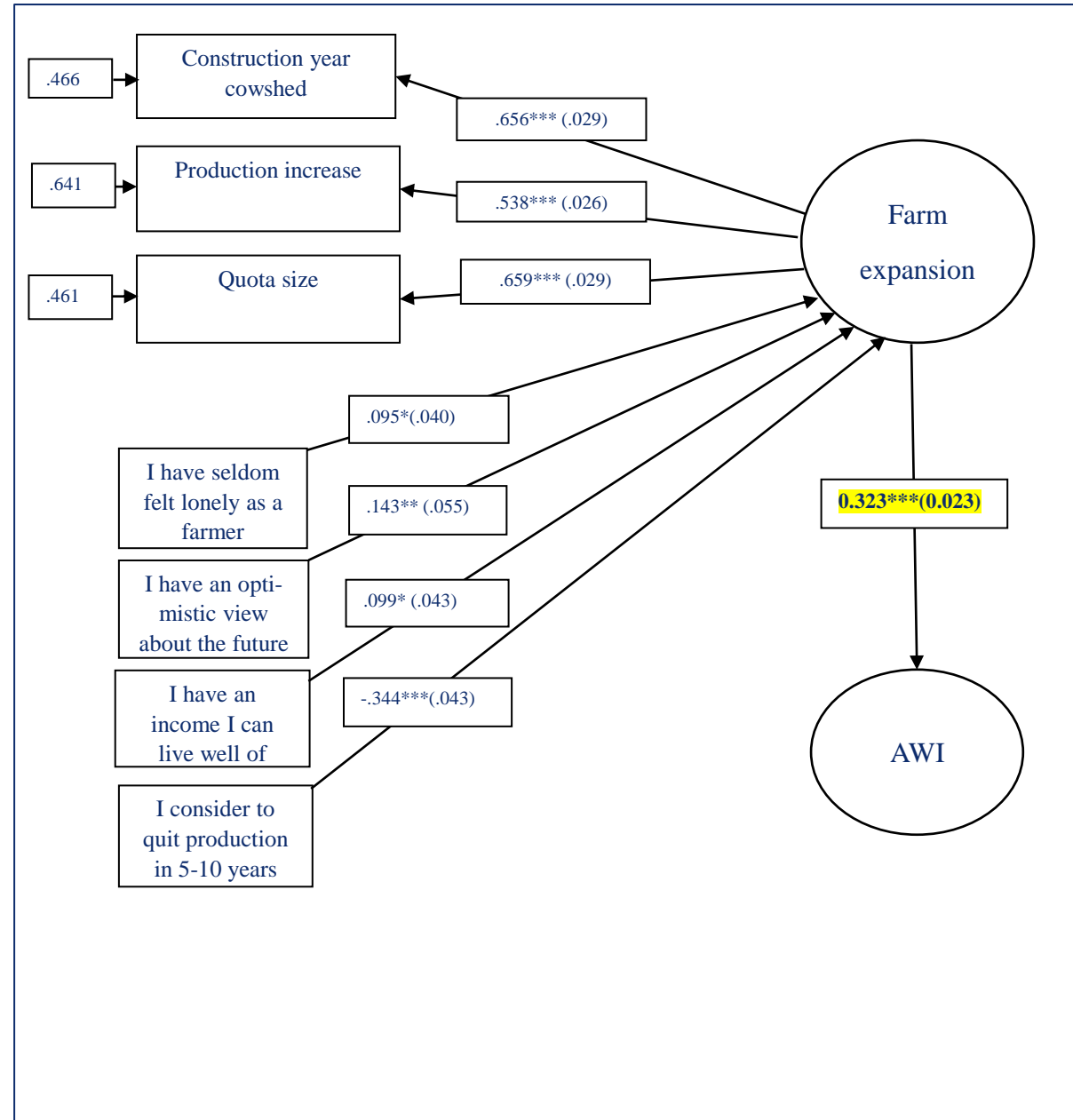
Results

- Model paper II, first boosting, then SEM
- Also good model fit
- The yellow items are «new»



Results

- Model II paper I
- SEM of farmer welfare, farm expansion and the AWI
- Good fit of the theoretical model



Conclusions and implications

- Farmer's occupational well-being, farmer stress and animal welfare measured by the AWI are linked. The higher the occupational well-being and the lower the farmer stress, the better the animal welfare.
- If we aim to improve the welfare of animals, we must also keep an eye at the farmer.
- Farmer's degree of loneliness and satisfaction with income, and farmer's optimism together with a determination to continue production, are also indirectly associated with the AWI through farm expansion.
- Farm expansion is positively associated with the AWI.
- Pre-conditioning of data with a statistical learning method (boosting) may ease the specification of a SEM in similar settings.

References

Paper I

Preventive Veterinary Medicine 170 (2019) 104741



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Contents lists available at ScienceDirect

Preventive Veterinary Medicine

journal homepage: www.elsevier.com/locate/prevetmed



Farmer welfare and animal welfare- Exploring the relationship between farmer's occupational well-being and stress, farm expansion and animal welfare

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Paper II

Structural Equation Modeling: A Multidisciplinary Journal (In Press)

Specification search in structural equation modeling (SEM): How gradient component-wise boosting can contribute

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Thanks for your attention!

