



Exploring Work-Related Characteristics as Predictors of Norwegian Sheep Farmers' Affective Job Satisfaction

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Abstract

Farmers' satisfaction with their farm job can have far-reaching implications, as farmer and livestock wellbeing is likely to be intertwined. The aim of this study was to explore how job satisfaction of Norwegian sheep farmers is associated with other work-related traits, such as work motivation, perceived physical work environment, the performance of management routines, and the proportion of their income derived from farming. Overall, respondents to the questionnaire ($n = 1206$) reported high levels of job satisfaction, and they were more intrinsically than extrinsically motivated. Regression analyses revealed that the strongest predictor of job satisfaction was intrinsic work motivation. Routinisation of management practices was also positively associated with job satisfaction, whereas extrinsic motivation and negative physical work environment were negatively associated. In conclusion, job satisfaction of Norwegian sheep farmers is mainly predicted by their intrinsic work motivation. Knowledge of this kind can be of use in supporting farmers, and through that enabling them to be proficient stockpeople.

Keywords

job satisfaction, Norway, sheep farmers, sheep housing, work motivation

Introduction

Farmers' satisfaction with their farm job can have far-reaching implications, as farmer and livestock wellbeing is likely to be intertwined. In a recent opinion piece, the British Farm Animal Welfare Committee concluded that there *'is a need for a greater awareness and recognition of farmer wellbeing, the factors that might affect it, and the possible consequences for animal welfare'* (Farm Animal Welfare Committee 2016). Interdisciplinary research combining natural and social sciences has been recommended to enhance our understanding of issues of relevance to animal

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welfare, and to achieve better problem-solving (Lund *et al.* 2006). Animals obviously have an integral place in livestock farmers' lives, and for many farmers, the care of the livestock has positive effects. Positive human – animal relationships can, in other words, benefit both farmers and their animals, but on the other hand, poor mental wellbeing of a stockperson can reduce his or her ability to ensure acceptable standards of animal welfare (Farm Animal Welfare Committee 2016).

In viewing stockpeople's job satisfaction as a prerequisite for optimal stockmanship, this study aims to gain a broader understanding of the factors that may influence job satisfaction among Norwegian sheep farmers. We will first present a contextual overview of Norwegian sheep farming, before we go on to describe the rationale behind this study, and how we conceptualise job satisfaction within this farming context.

The Norwegian sheep farming context

Norwegian sheep farming has some particular characteristics, of which some are linked to the cold climate, which strongly limits the grazing season (Phelan *et al.* 2016), and the mountainous geography, with spatial scattering of the land suitable for farming (Forbord *et al.* 2014). A strong state regulation of the agricultural structure through legislation and subsidies aims to secure farmers' income with otherwise uneconomically viable farm sizes, even out incomes between production types, farm sizes and regions, and maintain a rural population (Forbord *et al.* 2014). The subsidies to farming in Norway are among the highest in the world, accounting for 61 per cent of gross farm receipts in 2019, while in comparison, the average across EU is 19 per cent (OECD 2019). In spite of the high subsidies, it is increasingly common for Norwegian farm households to have additional income from off-farm employment, comprising 85 per cent of the farms in 2002 (Løwe 2004). For some farmers, the off-farm work is in fact the main source of the household income, and this is a common scenario among sheep farmers.

As for other livestock industries both within and outside Norway, there has been a shift towards fewer and larger farms over the past decades (Steinset 2014), with a gradual dwindling of farming communities as a result. Nationally, there are currently about 13,800 sheep holdings, with an average flock size of 64 ewes (Statistics Norway 2019). In comparison, the average sheep holding in the EU had 113 ewes in 2013, while UK (with the largest average flock size in the EU) had 449 ewes per flock, and Spain had 249 ewes per flock (AHDB 2016). Thus, Norwegian sheep farming can be considered small scale and extensive, with mainly family-run farms (Statistics Norway 2019), located in sparsely populated areas. The industry is also characterised by the extensive use of free-range forest and mountain pastures in the summer months, but throughout the cold season, which can last more than half the year, most sheep flocks are housed. This is most commonly in insulated buildings with slatted floors, where the stocking density is high. Over recent years, there has been an increasing interest in simpler and less costly building solutions, such as non-insulated sheds with deep litter bedding.

The rationale of the research

Conceptualising sheep farmers' satisfaction with farm work within the Norwegian context

Farmers' satisfaction with farm life, of which job satisfaction is one of several important domains, has previously been conceptualised as dependent on two sets of influences. One consists of structural aspects, such as off-farm employment, income and farm size, whereas the other relates to individual factors, such as age, education and commitment to farming (Molnar 1985; Coughenour and Swanson 1992). Affective (as opposed to cognitive) job satisfaction can be conceptualised as a global feeling about a job, measured by how much people subjectively and emotively like their job as a whole (Thompson and Phua 2012). The subjective meaning given to work is individual, multidimensional and complex (Fiorelli *et al.* 2010). Farming is not just a profession, but in many respects a way of life, and an integral and highly valued part of this is the farmers' autonomy, such as being one's own boss, having a lifestyle with access to outdoors, and freedom in decision-making and time management (Dessein and Nevens 2007; Stock and Forney 2014). A study of French multi-job-holder sheep farmers identified different types of subjective work rationalities, highlighting the important role played by freedom, affectivity, sensitivity and personal values (Fiorelli *et al.* 2010).

To our knowledge, there is no published literature concerning the predictors of the satisfaction Norwegian sheep farmers' feel about their farm work in specific. Statistics Norway investigated the overall quality of life of the farming population in general, and how it developed from 1995 to 2002 (Løwe 2004). From 1995, when farmers scored higher on life satisfaction than did the population in general, to 2002, dissatisfaction with the income from the farm had increased, particularly among meat producers, that is, also sheep farmers. Future financial support to Norwegian agriculture, effects of international trade negotiations, weather and succession issues were topics that caused concern (Løwe 2004). Loneliness has been reported to be associated with lower quality of life among Norwegian farmers (Melberg 2003; Løwe 2004), but work outside the farm can potentially reduce the loneliness (Løwe 2004). Melberg (2003) studied farm-related stress, social support and psychological well-being of husbands and wives on Norwegian farms, and concluded that farming as a way of life could increase the experienced wellbeing. However, a negative subjective evaluation of the household economy, problematic working conditions and severe health issues reduced the farmers' wellbeing (Melberg 2003). Research in a different farming population has previously suggested that individual characteristics of the farmer are the strongest determinants of their subjective wellbeing (Molnar 1985). These studies measured the overall satisfaction with life, while in our study we wish to look specifically at the farmers' affective satisfaction related to the farm work.

The theoretical framework of our model is based on the self-determination theory (SDT). This is an empirically based theory of human motivation, development, and wellbeing. Within this theoretical framework, different types of motivation receive attention as predictors of for example, performance and outcomes of wellbeing (Deci and Ryan 2008). It also addresses how needs for autonomy, competence and

relatedness affect both the type and strength of motivation. Based on this framework, we seek to assess how Norwegian sheep farmers' job satisfaction is associated with autonomous motivations and a measure of farm work performance. In addition, we wish to assess the role of the physical work environment that sheep farmers are exposed to.

The role of work motivation

Work motivation psychology concerns the needs that must be fulfilled in order for workers to experience mental wellbeing and satisfaction related to their work (Kolstrup 2012). Intrinsic motivation is defined as the doing of an activity for its inherent satisfaction, by being interesting, meaningful or fun. Extrinsic motivation, moreover, relates to doing something because it leads to external rewards such as money and status (Ryan and Deci 2000).

The quality of work experience and performance can vary, depending on whether a farmer or agricultural worker is driven by intrinsic or extrinsic motivation (Ryan and Deci 2000). A seminal article by Gasson in 1973 outlined how farmers may have multiple motives for farming other than economic profit. She identified that particularly small scale farmers tended to value the way of life, independence and performance of work tasks above economic aspects of their occupation (Gasson 1973). Although the context for farmers in Norway today in many respects may differ from the situation for UK farmers in the 1970s, they may still aim to maximise their satisfaction rather than maximising income. A study investigating the goals of livestock farmers in western Norway suggests that this may be the case, as increasing the family's quality of life was given higher priority than economic objectives (Bernués *et al.* 2016). A Swedish study also demonstrated the importance of intrinsic motivators in the dairy industry (Kolstrup 2012). In a comparison between a strongly competitive farming system with low governmental subsidies and a non-competitive, highly subsidised system, researchers found that monetary utility did not play a significant role for job satisfaction in the subsidised system (Besser and Mann 2015).

Based on existing literature, we hypothesise that Norwegian sheep farmers are more intrinsically than extrinsically motivated (H1). We also expect that farmers with high levels of intrinsic work motivation feel more satisfaction with the farm work (H2), whereas farmers more motivated by economic rewards may have lower levels of job satisfaction (H3).

Routinisation and self-efficacy in the management of sheep farms

Having established professional management routines throughout the production year may make the farm work more interesting and predictable, and may contribute to optimisation of production results and animal health and welfare. Farmers' satisfaction with life has also been linked with their opportunity to develop their skills (Coughenour and Swanson 1992), and craftsmanship (i.e., having the required skills) was the strongest positive influence of farmers' pride in a Belgian study (Dessein and Nevens 2007). Self-efficacy is concerned with what you believe you can do with

what you have, under a variety of circumstances, and is an important contributor to performance (Bandura 1997). People with strong beliefs about their capabilities will see difficult tasks as challenges to be mastered instead of threats to be avoided. In general, people construct their own personal standards that they use to guide, motivate and regulate their own behaviour, and they do the things that give them self-satisfaction and a sense of self-worth (Bandura 1997). Routinisation is advantageous when a person's skills are optimal for the tasks under a variety of circumstances. We therefore hypothesise that Norwegian sheep farmers who routinely perform many farm management practices also have a higher job satisfaction (H4).

The physical work environment in the sheep house

Housing conditions for farm animals have received attention as important determinants of farm animal welfare (Waiblinger 2009). However, livestock housing is also the workplace for the stockperson, and the environment it provides may, together with individual factors, affect the job satisfaction of stockpeople. The work environment is known to influence the psychological wellbeing of workers in many ways, including through the physical settings (e.g., temperature, illumination and noise) and the characteristics of the job (e.g., qualitative and quantitative workload and repetitiveness) (Briner 2000). Livestock farming can be physically demanding, with long work hours and physical burdens associated with farm work, which includes risks of stress and injury (Farm Animal Welfare Committee 2016). A poor physical working environment can directly influence the farmers' enjoyment and level of job satisfaction (Burton *et al.* 2012), and indirectly, through the effects the housing has on human-animal interactions and sheep health and welfare (Caroprese 2008; Dwyer 2009; Sevi *et al.* 2009). In a Swedish study of dairy farms, employees that perceived themselves as being exposed to more negative physical factors in their work, experienced more physical and psychosocial symptoms (Kolstrup 2012). Our hypothesis is therefore that farmers who experience more physical burdens in their work environment, have a lower level of job satisfaction (H5).

In addition, we wish to investigate whether and how the proportion of the income derived from farming is associated with job satisfaction. The literature is inconclusive in this respect, and dependence on subsidies further complicates the matter, as this may negatively influence farmers' pride (Dessein and Nevens 2007). An Irish study found that decisions regarding off-farm work were associated with non-pecuniary benefits tapping into constructs such as quality of life, life style, and enjoying farming (Howley *et al.* 2014). This association can therefore be positive or negative.

Hence, in summary, we aim to explore the interrelationships between the all the above-mentioned work-related factors and job satisfaction in the context of Norwegian sheep farming, while controlling for relevant demographic and structural variables.

Data and methods

This study is part of a larger interdisciplinary project focusing on the pros and cons of different housing and management systems for sheep, in terms of sheep health and

welfare, human – animal-relationships, productivity, and farmers' job satisfaction, work motivation and perception of their work environment.

Questionnaire

The questionnaire was developed using an online survey system (QuestBack™). The following paragraphs describe the three parts of the questionnaire included in the present study.

Background variables. The first part of the questionnaire contained questions regarding the demographic background of the farmer, for example, gender, age, marital status, children, experience, education level, and proportion of the household's income derived from sheep farming. Several of these variables are included as control variables in this study.

Housing and management practices. The second part of the questionnaire related to the structural aspects of the sheep farm, for example, flock size, type and age of sheep housing, floor type etc. In addition, there were 17 statements pertaining to resources and management routines, scored on a 5-point Likert-like scale from *Completely correct* to *Completely incorrect*. Twelve of these statements targeted management practices that are independent of structural resources related to the housing, and are included in this part of the study.

Work related traits. The final part of the questionnaire included multi-item rating scales pertaining to the farmers' behavioural attitudes, job satisfaction, work motivation, and their perceived physical work environment. The attitude scale will be described in a separate article (Muri *et al.*, forthcoming).

The questionnaire included the Brief Index of Affective Job Satisfaction (BIAJS) (Thompson and Phua 2012), which is a validated, four-item, affective (as distinct from cognitive) job satisfaction scale. In addition to the four job satisfaction items, the scale includes three distracter items to obscure the obvious intention to measure job satisfaction (Thompson and Phua 2012). The items were scored on a 5-point scale from *Strongly disagree* (= 1) to *Strongly agree* (= 5).

The work motivation scale had 11 items, of which six items were taken from the QPSNordic General Questionnaire for Psychological and Social Factors at Work (Skogstad *et al.* 2001), which includes both intrinsic and extrinsic motivating factors. The remaining items were more specific to farmers' work situation, and either derived from Kolstrup (2012) or developed specifically for this questionnaire. Responses were requested on 5-point Likert scale from *Not important* (= 1) to *Very important* (= 5).

To determine the responders' perceived exposure to negative physical factors in their work environment, we used eight of the nine items from a Swedish study of dairy farmers (Kolstrup and Hultgren 2011). We rephrased the questions from '*Have you during the last 12 months regularly experienced discomfort from (..)*' to '*How often during the winter housing period do you experience discomfort due to the following conditions in the sheep housing?*'. The exposures they were asked about were noise, unsuitable climatic conditions, insufficient illumination, lifting heavy burdens, monotonous or repetitive

work, awkward working postures, dust, and noxious gases or chemical solvents. The responses were requested in a 5-point scale from *Very rarely* (= 1) to *Very often* (= 5).

Sample

The research design was a cross-sectional survey with retrospective elements. The reference population is the entire population of sheep farmers in Norway. Contact lists were primarily collected from the Norwegian Sheep Recording System (NSRS), which is a national register collecting data on sheep health and productivity. NSRS is owned by The Norwegian Meat and Poultry Research Center (Animalia), which is non-profit organisation owned by the meat and poultry industry. In 2014, when the data for this study were collected, 4,313 sheep farms were members of NSRS, constituting 31.3 per cent of all sheep farms in Norway. From the NSRS, we obtained 3,182 email addresses. The rationale for mainly recruiting NSRS members was that the sheep health and production data are required in other parts of this research project. To assess whether NSRS members differ systematically from non-members, we also purchased contact information for 600 non-NSRS members from a commercial register over all farm properties (Produsentregisteret, prodreg.no), balanced in terms of farm numbers for each county.

After removal of non-functioning email addresses and duplicates, we were left with 3,764 unique email addresses. The questionnaire was initially distributed by email on 1 March 2014, with a unique link to the questionnaire for each recipient. Non-responders received up to three reminders by email, and the data collection closed on the 16 May 2014.

The questionnaire was correctly completed by 1,206 of the 3,764 recipients, resulting in a response rate of 32 per cent. This response rate is acceptable, but may still be a cause of concern. We did not follow up non-responders to assess if they differed systematically compared to responders. It is not unlikely that the response rate was higher among more satisfied farmers. One implication of this may be that the predictor effects in our analyses are weaker than the true effects. Although our analyses revealed no significant differences in job satisfaction between NSRS members and non-members, our results may not be entirely representative for all Norwegian sheep farmers. However, by controlling for the proportion of income from farming, farm size and a number of other structural and demographic variables in the full and reduced regression models, we have adjusted for potential shortcomings in terms of representativeness associated with these variables.

Data management and statistical analyses

All statistical analyses were performed in Stata SE 14.2 (StataCorp, College Station, TX, USA).

Mean scores of the 12 statements pertaining to management practices were summarised to a new variable labelled *Management*. Scores on individual items were first reversed so that a high score on *Management* corresponded to many practices being

performed routinely, according to the farmers own reporting. The internal consistency (α) of these 12 items was 0.70.

The psychometric scales (job satisfaction and work motivation) were examined using principal-component analysis (PCA) with Varimax rotation (with Kaiser normalisation) for work motivation, and oblimin rotation for job satisfaction. The type of rotation was determined by whichever method produced a simple structure (Tabachnick and Fidell 2013). Oblique rotation (such as oblimin) allows the components to correlate and sometimes yields more interpretable components with a simpler structure than that obtained with an orthogonal rotation (StataCorp LP 2015). A combination of the elbow plot criterion and Kaiser's criterion (Tabachnick and Fidell 2013) was used to determine the number of components to retain. The suitability of the data for multivariate statistics was assessed using the Kaiser Meyer Olkin's measure of sampling adequacy.

For each retained component of job satisfaction and work motivation, we created an index variable (scale) comprising the mean of the retained items. The criterion for including an item in the index was a loading of 0.33 or more on that factor, and the maximum permitted cross loading on other factors was 0.33. We also only included variables with a uniqueness value (i.e., the proportion of variance for the variable not explained by the common factors) below 0.5.

Ordinary least squares linear regression analysis was used to investigate which variables were associated with job satisfaction. To reduce the number of potential independent variables, we only tested variables that logically could be expected to have an effect on job satisfaction, and/or have been known to affect job satisfaction from other studies (eg. education (Coughenour and Swanson 1992)). We started with a full model, in which all variables defined as predictors of interest or control variables were assessed. Hence, in addition to our primary predictors of interest, the full model included: gender, age, years of experience, education, marital status, number of children, generations involved in the farm work, background (rural or non-rural), housing type, number of sheep houses, age of the sheep house, flock size, and NFSR membership. We then removed variables with the most non-significant p -values first. Only variables that were significantly associated with the outcome ($p < 0.05$) were retained in the final model. When left with a model with variables fulfilling the criteria, each variable was re-entered to assess the effect. In addition to assessing significance, the change in the Bayesian Information Criteria (BIC) was used to assess whether the model improved by entering or removing variables (Dohoo *et al.* 2009). For categorical predictors, the overall significance of the set of indicator variables was assessed using Wald's test.

To test whether the major assumptions of linear regression were fulfilled, we primarily relied on graphical methods, and used statistical tests as supplements. Linearity between job satisfaction and continuous predictors was assessed graphically using the `lintrend` command in Stata, and by plotting LOWESS smoothed curves of standardised residuals against each predictor. To assess whether heteroscedasticity was present we ran the Breusch–Pagan test and plotted standardised residuals against predicted values. Normality of residuals was assessed by visually inspecting a histogram of the residuals and a Q-Q plot. To account for heteroscedasticity, we re-ran

the models using robust standard errors. The results presented are from the latter analysis.

Methodological considerations

The use of questionnaires and self-report measures means that one needs to be aware of possible sources of bias, such as social desirability bias. The overtly obvious intention to measure job satisfaction was reduced by the use of distractor items (Thompson and Phua 2012). Low cross-loadings of these items suggest that they fulfilled their function of attenuating common method variance.

Ethical and confidentiality considerations

Prior to responding to the questionnaire, participants were provided with information about the study objectives and their right to withdraw from participation at any time. The study was approved by the Norwegian Centre for Research Data (NSD, project no. 36978), which is the Data Protection Official for Research for Norwegian universities. Anonymity of respondents was safeguarded by replacement of email address and producer number with an anonymous code in the dataset.

Results

Description of the responding sheep farmers and their farms

Twenty-one per cent of the respondents were female, and 79 per cent were male. The mean (\pm SD) age was 48.4 (\pm 10.7) years, and median length of experience in sheep farming (measured as 5-year intervals) was 21–25 years. Most of the respondents were married or cohabitants (87.9 per cent), about half (53.1 per cent) with children under the age of 18 living at home, whereas 27.4 per cent had children over the age of 18 living at home. On 61.3 per cent of the farms, there were two or three generations involved in the farm work. However, the vast majority, that is, 1,073 (88.9 per cent) of the responding farmers, reported that they had the *main* responsibility for the care of the animals themselves. More than half of the respondents (58.9 per cent) grew up on the same farm, while 16.7 per cent grew up on another farm, and 9.6 per cent grew up in rural districts, but not on a farm. Ten per cent grew up in small towns, and only 4.7 per cent grew up in cities. Just over one third of the farmers had higher education (\geq 2 years at college/university, agricultural or other), 61.3 per cent had upper secondary school (agricultural or other) as their highest education level, whereas eight per cent had no education above lower secondary school. Eighty nine per cent of the respondents were NSRS members.

The vast majority (83.7 per cent) of the farmers kept their sheep in a single building, while 14.2 per cent had two buildings and only 2.1 per cent had the sheep in more than two buildings. On 60 per cent of the farms, the building in which the main proportion of the animals were housed was of the insulated type. The most common floor type was stretched metal grating (dominating in 46 per cent of the buildings),

followed by deep litter (dominating in 20 per cent of the buildings). Almost a quarter of the farmers (22.6 per cent) had built new housing or had major upgrading of the existing sheep housing in 2008 or later. Only 7.5 per cent had buildings that were built in 1950 or earlier. Thirty-five per cent of farms had less than 50 ewes (reported as the no. mated in the previous season), and 34 per cent had between 50 and 99 ewes. Only 12 per cent had more than 150 ewes.

Job satisfaction

The principal components analysis of the items in the Brief Index of Affective Job Satisfaction (BIAJS) confirmed the validated structure. That is, the four job satisfaction items all loaded highly on the first component, whereas the distractor items loaded on a separate component, with low cross-loadings on the job satisfaction items. Re-running the analysis without the distractor items confirmed the unidimensional properties of the BIAJS, with 66 per cent explained variance, and high and reasonably uniform component loadings ranging from 0.75 to 0.85 (Table 1). The internal consistency of the four job satisfaction items was good, with a Cronbach's alpha of 0.82. Thus, we created a score comprising the mean of these items, which ranged from 1.0 to 5.0 and had a mean score (\pm SD) of 4.1 (\pm 0.6).

Work motivation

The mean score (\pm SD) of the individual items in the work motivation scale are presented in Table 2. The principal components analysis of these items resulted in a two-component solution. Four variables were removed from the analysis; two of them due to cross loading, and two due to a combination of high uniqueness and a lack of logical association with the other items. The first component explained 37.8 per cent of the variance, while the second component explained 24.3 per cent (overall 62.1 per cent). The Kaiser-Meyer-Olkin's measure of sampling adequacy gave an overall statistic of 0.75, indicating adequate sampling. For component one, there were five items that satisfied the criteria, with loadings ranging from 0.57 to 0.82; *To work with animals*, *To contribute to good animal welfare*, *The lifestyle that goes with farming*, *The experience of doing something valuable*, and *Having a professional network with other farmers*.

Table 1: Norwegian sheep farmers' ($n = 1206$) mean scores (\pm SD) on the four items of the Brief Index of Affective Job Satisfaction (BIAJS), and their component loadings from the principal component analysis

Variable	Mean	\pm SD	Loading
Most days I am enthusiastic about my job	3.99	0.70	0.849
I feel fairly well satisfied with my job	4.17	0.63	0.832
I find real enjoyment in my job	4.39	0.62	0.813
I like my job better than the average person	3.70	0.81	0.745

The items were scored on a 5-point scale from *Strongly disagree* (= 1) to *Strongly agree* (= 5).

Table 2: Mean score (\pm SD) of items in the work motivation scale (listed in order of relative ranking), and the loading on components 1 and 2 from the PCA ($n = 1206$)

Motivation item	Mean	SD	Loading, Comp 1	Loading, Comp 2
To work with animals	4.3	0.7	.816	
To contribute to good animal welfare	4.5	0.6	.789	
The lifestyle that goes with farming	4.2	0.8	.725	
The experience of doing something valuable	4.3	0.7	.700	
Having a professional network with other farmers	4.2	0.8	.570	
Having a high salary and material benefits	3.2	1.0		.895
That the job provides a stable and secure income	3.6	1.1		.872

The respondents were asked: 'When you think specifically about your job as a sheep farmer, how important are the following factors?'. Responses were requested on 5-point Likert-like scale from *Not important* (= 1) to *Very important* (= 5).

All these items tap typical intrinsic rewards and motivations, hence this component was labelled *Intrinsic work motivation* and had an internal consistency (α) of 0.77. The new variable ranged from 1.0 to 5.0, and the mean score (\pm SD) was 4.3 (\pm 0.5). The two highest loading items on the second factor had loadings of 0.90 (*Having a high salary and material benefits*) and 0.87 (*That the job provides a stable and secure income*), respectively, and these two items had an internal consistency (α) of 0.76. The component was labelled *Extrinsic work motivation*, as both items pertain to monetary return and material benefits. The new variable ranged from 1.0 to 5.0, and the mean score (\pm SD) was 3.8 (\pm 0.9). (Initially, we constructed an expanded scale with four items. We dropped this scale due to low internal consistency ($\alpha = 0.63$), and because two items had high uniqueness and lacked logical association with the other items. The expanded and the reduced scales gave approximately identical results in the regression analysis).

Routinisation of management practices

The self-reported performance of management practices related to sheep health, welfare and productivity are presented as mean score (\pm SD) for each of the 12 statements in Table 3. The most commonly performed management routines were completing health records, checking all udders and teats prior to pasture turnout, making sure all vulnerable lambs get colostrum, and body condition scoring all ewes at least once during pregnancy. The least commonly performed practices were body condition scoring prior to mating, flushing, and dipping lambs' umbilical cords in an antiseptic. Internal consistency (Cronbach's alpha) among these twelve variables was 0.70. The new, overall *Management* variable (i.e., the mean score of all the items) had a range of 1.6–5.0, and the mean (\pm SD) was 4.1 (\pm 0.5).

Table 3: Norwegian sheep farmers' ($n = 1206$) self-reported management routines, presented in order of their relative ranking, with mean score ($\pm SD$)

Statements about management routines	Mean	$\pm SD$
All preventive measures and medical treatments are registered in health cards	4.7	0.7
All udders and teats are controlled before the ewes are turned out on pasture	4.6	0.8
All weak lambs and lambs from large litters are followed up extra to ensure their colostrum intake	4.6	0.6
All ewes are condition scored at least once during pregnancy	4.4	0.9
All overgrown claws are trimmed as soon as they are discovered	4.3	0.9
Thorough washing of hands and around the perineum of the ewe is always performed prior to lambing assistance	4.1	1.1
All claws are assessed more than once yearly	4.0	1.1
There are people present at all lambings	4.0	0.8
All ewes are vaccinated twice the first year, and subsequently yearly	4.0	1.4
All ewes are condition scored prior to mating	3.9	1.1
All ewes are fed abundantly before mating to improve reproduction ('flushing')	3.2	1.3
All umbilical cords are treated with iodine tincture or other antiseptic	3.0	1.7

The respondents were asked "To which degree are the claims about the management routines correct?". Each statement was scored on a Likert-type scale from *Completely correct* to *Completely incorrect*. A high score implies that the management practice in question is performed routinely.

Perceived physical work environment

The distribution of the farmers' perceived physical work environment revealed that *Awkward working postures* (mean = 2.69, SD = 0.84), *Lifting heavy burdens* (mean = 2.63, SD = 0.92) and *Repetitive work* (mean = 2.53, SD = 0.94) were the three exposures reported to be experienced most frequently. The three least commonly reported exposures were *Noxious gases or chemical solvents* (mean = 1.57, SD = 0.72), *Insufficient illumination* (mean = 1.81, SD = 0.87) and *Unsuitable climatic conditions* (mean = 1.92, SD = 0.77). To reduce the number of variables, we generated an index variable comprising the mean score of all the eight exposure scores. The new variable ranged from 1.0 to 4.4, and the mean score ($\pm SD$) was 2.2 (± 0.5). Since this is an index (formative model) and not a scale (reflective model), internal consistency (Cronbach's alpha) is not an issue.

Income from farming

The majority (66.9 per cent) of the respondents reported that sheep farming contributed to 25 per cent or less of the household's total income (7.7 per cent of the farms actually reported that they had no income from farming). Twenty-four per cent of

Table 4: Linear regression model with robust standard errors, determining the predictors of the job satisfaction among Norwegian sheep farmers ($n = 1206$)

Independent variable	N	Coefficient (β)	Robust SE	p value	95% C.I.
Intercept		1.25	0.17		
Intrinsic motivation		0.64	0.03	<0.001	0.58–0.69
Extrinsic motivation		-0.04	0.03	0.005	-0.07–0.01
Management		0.12	0.03	<0.001	0.06–0.18
Exposure		-0.10	0.03	<0.001	-0.15–0.05
% of income from sheep farming (0 % = ref.)	93				
1–25 %	714	-0.01	0.05	0.800	-0.11–0.08
26–50 %	286	0.05	0.05	0.335	-0.05–0.16
51–75 %	81	0.02	0.07	0.768	-0.12–0.16
76–100 %	32	0.21	0.08	0.013	0.04–0.37
Age (<41 years = ref.)	289				
41–50 years	405	-0.09	0.03	0.009	-0.15–0.02
51–60 years	347	-0.09	0.03	0.013	-0.16–0.02
>60 years	165	-0.08	0.04	0.036	-0.16–0.01

Significant p values (< 0.05) in bold.

the farmers derived between 26 and 50 per cent of their income from farming. Only 2.7 per cent ($n = 32$) derived more than 75 per cent of the household's income from sheep farming.

Regression analysis

The final regression model with job satisfaction as the outcome explained 44 per cent of the variance. *Intrinsic motivation* was by far the strongest predictor of Norwegian sheep farmers' job satisfaction, explaining 41 per cent of the variation in *Job Satisfaction* when assessed unconditionally. An increase of one unit on this scale corresponds to a 0.6-point increase on the job satisfaction scale. *Management* and a high proportion of total income from farming were also positively related to job satisfaction, whereas *Extrinsic motivation* and perceived exposure to negative working conditions (*Exposure*) were negatively associated with job satisfaction. The final model with regression coefficients (β), robust SE, p values and confidence intervals for all significant predictors is presented in Table 4.

Discussion

The rationale for this research is to improve our understanding of potential prerequisites of farmers' performance in terms of ensuring high standards of animal welfare. Using existing literature and a framework based on the self-determination theory

(SDT), we generated hypotheses about how work motivation, management style, perceived physical work environment and proportion of income from farming may be associated with Norwegian sheep farmers' affective job satisfaction.

Job satisfaction among Norwegian sheep farmers

On average, Norwegian sheep farmers in this study reported a level of job satisfaction of 4.1 out of a maximum score of 5. To assess this, we used a job satisfaction scale that has been validated in terms of internal consistency, convergent and criterion-related validity, reliability and cross-population equivalence, where the mean score across the populations was 3.98 (Thompson and Phua 2012), that is, marginally lower than in our study. This measure seeks to tap the overall affective response to the farm job, that is, how much respondents subjectively and emotionally like their job, and not cognitive beliefs about the job (Thompson and Phua 2012).

Dimensions of work motivation

The multivariate analysis of the motivation scale revealed a structure consistent with the division between intrinsic and extrinsic motivations described in the literature (Ryan and Deci 2000). The mean score on intrinsic motivation was higher than for extrinsic motivation, suggesting that sheep farmers overall are more driven by performance of the farm-related activities and the associated lifestyle, rather than instrumental rewards. The four motivations ranked highest were to contribute to animal welfare, to work with animals, to have a meaningful job, and the lifestyle that goes with farming. The non-monetary benefits of farming have been recognised for many years. In 1973, Gasson reported that farmers from smaller farms placed more emphasis on intrinsic values, particularly independence, than farmers on larger units (Gasson 1973). Recent studies from other Nordic countries have also found intrinsic motivators to be highly important for livestock farmers (Kolstrup 2012; Bernués *et al.* 2016). A Swedish study investigated factors that motivate dairy farmers in their work (Kolstrup 2012). They found that items that represent intrinsic motivation, such as work being fun, interesting and meaningful, feeling pride, and living in the country side, were overall ranked highest, whereas extrinsic motivating factors were ranked lower (Kolstrup 2012). The role of working with animals was identified as a source of pleasure among multi-job-holder sheep farmers in France, where relationships with the animals were seen as a source of pleasure, recognition and well-being (Fiorelli *et al.* 2010). An Irish study investigated farmers' perceptions of non-pecuniary benefits associated with farm work, and how this affected their decisions regarding off-farm labour (Howley *et al.* 2014). The non-pecuniary benefits have similarities with intrinsic work motivation, tapping constructs such as quality of life, life style, and enjoying farming. The scores on these measures were very high for all types of farmers, but interestingly, sheep farmers scored lower than beef and dairy farmers (Howley *et al.* 2014). The authors of that study emphasised that failing to take account of non-pecuniary benefits can mean that policy makers draw wrong conclusions about the response from farmers to changes for example, in the off-farm labour market and rural development policies.

In summary, intrinsic motivating factors, including working with animals and contributing to animal welfare, appears to be more important than monetary motivations among sheep farmers in Norway, in line with our first hypothesis (H1).

The results of our regression analysis suggest that the strongest determinant of the sheep farmers' job satisfaction was intrinsic work motivation. Extrinsic work motivation, that is, factors mainly related to monetary rewards, were negatively associated with job satisfaction. These findings are both in line with what we hypothesised (H2 and H3). Although not statistically significant, another study of Norwegian sheep farmers found that prioritising non-monetary above monetary goals was associated with lower likelihood of intentions to leave farming (Flaten 2017). The authors proposed that high satisfaction with the varied lifestyle and other non-monetary benefits explains why profitability is of lower relevance in decisions to remain or exit. In Besser and Mann's (2015) study comparing a strongly competitive farming system with low governmental subsidies (North East Germany) with a non-competitive, highly subsidised system (Switzerland), they found that monetary utility played a significant role for job satisfaction only in the competitive system. The Norwegian farming system is, with regards to subsidy levels, comparable with the Swiss system. The Swiss farmers were overall more satisfied with their farm job than their German counterparts (Besser and Mann 2015). This may be due to the relative security experienced under the protective agricultural subsidy-system. The farmers on these farms may for instance be motivated by higher-order need gratification, resulting in a higher level of job satisfaction (Besser and Mann 2015). Our results on the relationship between intrinsic motivation and job satisfaction are also similar to previous findings from other farming populations in different contexts. Non-economic rewards were also found to be much more important determinants of farmers' satisfaction with farm work than extrinsic rewards among Kentucky farmers (Coughenour and Swanson 1992; Coughenour 1995), and commitment to farming as a way of life, was found to be the best predictor of satisfaction among Alabama farmers (Molnar 1985). Thus, there is some indication that the importance of individual characteristics, such as values and motivation, may be common across different farming systems and contexts.

There is probably a reciprocal relationship; motivation affects job satisfaction, but a high level of job satisfaction may strengthen these motivations. Those farmers who have made an active decision to go into farming from another background have evidently made value judgements in favour of this occupation and the lifestyle that goes along with it. This includes the work and contact with animals, a physical job, and a high degree of autonomy. For most farmers it also involves having additional off-farm employment to secure the household's income, as well as working in companionship with their spouse and other generations of family members on the farm.

In Norway, the Allodial Act provides family members the status of preferred buyer when farm properties are available for sale, which means that the majority of farm transactions are made within the family (Forbord *et al.* 2014). This is reflected in our results, where almost 60 per cent of the respondents grew up on the same farm that they worked on, and three quarters of them had a farming background. The farmers who had taken over the farm from their parents had not necessarily made an active career choice to the same degree, but may have been expected to take over the farm. In these cases it is plausible to argue that motivations may have developed in

response to the person's environment, which includes growing up with these expectations. Gasson (1973) proposed that these farmers may absorb values appropriate to their calling.

Routinisation and self-efficacy

Having established many management routines was positively associated with job satisfaction, in line with our hypothesis (H₄). There are different ways this association could be interpreted. Firstly, the results obtained from routinely performing management practices aiming to improve productivity, health and welfare may in themselves improve job satisfaction. Secondly, the implementation and the judgments involved in these practices throughout the production year may make the work more interesting. Finally, we propose that the higher level of job satisfaction among farmers with more routinisation is mediated through a higher perceived self-efficacy. Without a certain level of perceived self-efficacy, the farmers would be less likely to perform these behaviours routinely. An efficacious view both improves accomplishments, and reduces stress and vulnerability to depression (Bandura 1997). Perceiving self-efficacy in work-related decision-making has been highlighted as important for farmers' wellbeing (Soosai-Nathan and Delle Fave 2017). Among French multi-job-holder sheep farmers, satisfaction in work performance was one of the identified subjective work-related rationalities, and they especially liked working with animals (Fiorelli *et al.* 2010). Choosing whether and how to perform a range of tasks is also an integral aspect of farmers' autonomy, so this may also be interrelated with their intrinsic motivation.

Sheep farmers' perception of their physical work environment

The farmers' perception of their physical work environment was also significantly associated with job satisfaction. A higher perceived exposure to negative physical factors overall, was associated with a lower job satisfaction, which is as we hypothesised (H₅). The working environment on farms may place demands on the farmers that workers in most other workplaces do not encounter, like variations in temperature, humidity, odours, dust and physical danger (Coleman 2004). Other studies have also found that Norwegian farmers who are more often exposed to physical dangers and who work in poor physical environments, have a lower level of subjective wellbeing (Melberg 2003). Awkward working postures, lifting heavy burdens and repetitive work was reported most frequently by sheep farmers in this study. The same type of burdens have also been reported from the dairy industry (Kolstrup and Hultgren 2011). Other exposures, such as noise, unsuitable climatic conditions, insufficient illumination and gases, were by and large rarely reported in this study. This suggests that the main negative factors in the sheep farmers' work environment are related to physically demanding work tasks, rather than environmental aspects determined by the type of building, such as climate. Systems that reduce these burdens, such as automated equipment and facilities that ease animal handling, could therefore be beneficial for sheep farmers' job satisfaction.

The proportion of the household's income from sheep farming

The proportion of the households' income derived from sheep farming was also significantly associated with job satisfaction in this study. The small group of farmers ($n = 32$) who reported that 75 per cent or more of the household's income came from sheep farming had a significantly higher job satisfaction. Due to this small number and lack of information about the actual income level from on- and off-farm work, the association must be interpreted with caution. Molnar (1985) also found a positive correlation between the proportion of income from farming and subjective wellbeing, while Dessein and Nevens (2007) found that acquiring money from farming only had a weak influence on farmers' pride. Many sheep farms in Norway are part-time operations that are integrated in off-farm work, and high off-farm income has recently been seen to have a pulling force on exit intentions (Flaten 2017). On the other hand, a study of Norwegian farm women found that those who worked mainly off-farm and those combining work on and off farm reported a higher level of life satisfaction (Haugen and Bleksaune 2005). Statistics Norway reported that the overall quality of life was higher for Norwegian farmers with off-farm work than for those with no work outside the farm, but it was not significantly related to the actual income level (Løwe 2004). Off-farm work may either be an economic survival strategy or a way to retain a farm residence and a rural life-style (Molnar 1985). When it is a personal choice, it is more likely to be associated with higher satisfaction (Dessein and Nevens 2007). Not having any off-farm work at all is rare among Norwegian sheep farmers, therefore we cannot assess whether external employment in itself influences job satisfaction for this group of farmers. It would be reasonable to assume that additional income could provide a level of security that reduces the pressure for all on-farm activity to be productive. For sheep farmers, this could potentially allow for more discretionary but non-productive behaviour, for example, spending time with the sheep and doing husbandry activities at a leisurely pace, which may make the farm work more pleasurable. However, off-farm work may also increase the stress due to a more hectic everyday life, work overload and conflicting career demands (Melberg 2003). This may be the reason why farmers who to a larger degree rely on off-farm income have lower levels of job satisfaction.

Structural and demographic variables

None of the structural variables and only a few of the demographic variables were significantly associated with job satisfaction and therefore included as control variables in our final model. In line with our results, Coughenour and Swanson (1992) found no significant association between farm satisfaction and having a farm background. However, they did find a positive and slightly curvilinear association between the farmers' age and satisfaction with life. In their study, the highest satisfaction was reported among the oldest farmers, regardless of farm size (Coughenour and Swanson 1992). A positive correlation between farmers' age and subjective wellbeing were also found by Molnar (1985). This is in contrast to our study, where all age categories above 40 years had a significantly lower job satisfaction compared to farmers aged 40 or younger. Statistics Norway also found lower levels of job satisfaction among

Norwegian farmers in the age group 40 to 59 years (Løwe 2004). The varying findings can perhaps be a reflection of the different measures used, that is, overall life satisfaction vs. job satisfaction, as well as differing farm systems between US and Norway. Worries, lack of social support, reduced status and repeated exposure to the physical burdens may potentially have cumulative negative impacts on job satisfaction over time.

Overall, our model explained a much greater amount of variation ($R^2 = 0.44$) than the most complete model described by Coughenour and Swanson (1992), which included both farm rewards and values, farm structure and individual variables, including farm optimism ($R^2 = 0.12$). This is despite their model having a larger number of significant predictors. The reason may be that our motivation scale, of which the intrinsic factor was by far the strongest determinant of job satisfaction, tapped aspects highly relevant to job satisfaction that were missing in their study. In the interpretation of the presented results, it is important to bear in mind that the statistical analyses only provide evidence of associations and not causality. In other words, the associations between the predictors and outcome may be reciprocal and mutually reinforcing.

Many studies of job satisfaction also include cognitive, rational evaluations of the job, whereas the instrument we used only taps affective job satisfaction (Thompson and Phua 2012). Other theories focus on job demand and level of control (Briner 2000). It is known from other studies (Løwe 2004; Haugen and Bleksaune 2005) that health problems can be important determinants of Norwegian farmers' life satisfaction. It is also known that many Norwegian farmers, particularly livestock farmers, struggle with mental health issues (e.g., Sanne *et al.* 2004; Torske *et al.* 2016). Scoring positively on measures of wellbeing and at the same time feeling hopeless about the future has been reported from the agricultural sector in several countries, and is a contradiction not yet fully understood (Soosai-Nathan and Delle Fave 2017). Some of the problems can be related to stressors such as long work hours, heavy physical work, risks of injury, loss of animals to predators, psychological stress and social isolation. Several other variables may also influence job satisfaction, including factors outside the farm, such as personal relationships, job security and local health care provisions (Briner 2000). However, these factors would probably just increase the amount of error rather than systematically affect the results, and investigating all factors that may influence job satisfaction is outside the scope of this study.

There may be questions as to whether our results are specific to the Norwegian sheep farming context, assessed at this particular time, or whether the results are generalisable to other livestock farming contexts. Farming is after all strongly rooted in local traditions to a larger degree than many other occupations. However, our results appear to be in agreement with the literature on the importance of non-monetary benefits from farming, which has been reported across different farming contexts, suggesting that the associations may not be entirely specific to our study population.

Future research

Future investigations into the work-related traits described in this article could benefit from including measures of farmers' mental health, and how these factors in turn

may influence animal welfare. Much is still unknown about the causes of the mental health problems and their consequences in terms of farmers' job performance. There is also a scarcity of studies investigating the role of self-efficacy in farming, which may be an interesting path to increase our understanding of farmers' management decisions and job satisfaction. We agree with Lund and colleagues, that interdisciplinary approaches, combining biological and social sciences, are required to broaden our understanding of the farmer – livestock relationships, with the ultimate aim of improving the lives of both humans and animals (Lund *et al.* 2006). Hence, in this research project, we will also explore if and how farmers' motivations and job satisfaction are associated with sheep welfare (Muri *et al.* forthcoming).

Conclusions

Overall, Norwegian sheep farmers in this study reported a high level of job satisfaction. They were largely intrinsically motivated, and this was by far the strongest predictor of their job satisfaction. The intrinsic motivation relates, among others, to working with animals and contributing to good animal welfare. This research adds to the existing literature on the role of individual characteristics and non-monetary benefits from farming, which is important to bear in mind when developing schemes to improve both farmer and livestock wellbeing.

Our results also suggest that sheep farming can be perceived as a physically demanding job, mainly because of the physical tasks the farmers perform, and that this may have detrimental effects on job satisfaction. Designing houses and systems that allow for the use of automated equipment and easy animal handling could therefore contribute to reduce these burdens and improve job satisfaction. This could also improve job satisfaction indirectly, by reducing some of the barriers against performing important management routines, which was another significant determinant of job satisfaction in this study. This effect may be mediated through self-efficacy. Overall, our study lends support to the importance of social-psychological traits as predictors of job satisfaction among farmers, and illustrates why animal welfare science, due to its complexity, can benefit from collaboration with social sciences. Knowledge of this kind can be of use in supporting farmers, and through that enabling them to be proficient stockpeople.

Conflict of interest

The authors declare no conflicts of interest.

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