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Factors affecting exit intentions in Norwegian sheep farms

Ola Flaten

Norwegian Institute of Bioeconomy Research (NIBIO), Department of Business Economics and Management, P.O. Box 115, 1431 Ås, Norway

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ABSTRACT

Western livestock sectors have shifted towards fewer, larger farms, causing concerns about the appearance of the countryside, ecosystem services, and rural depopulation. This study empirically estimates factors likely to affect exit intentions in sheep farms. Data were collected from specialised sheep farms included in the Norwegian Farm Business Survey. Of the 59 responses, 44 operators believed the farm would be producing sheep in 10 years. A logistic regression model was used to determine the most decisive variables associated with an exit intention, where the interdependence of factors affecting profitability and, subsequently, exit intention were taken into account. This study found that farmers reporting the most positive views of the local farming community were less likely to plan an exit. Exit intentions were not significantly influenced by farming goals, location, off-farm income, or profitability. The primacy of non-economic, community-based factors as an engine to sustain farms, suggests that more attention need to be paid to social processes and relations in local communities. Farmer groups and policy-makers should consider how to encourage supportive local communities when designing policies to retain sheep farms.

1. Introduction

Over the last decades, Western livestock sectors have witnessed substantial shifts to fewer, bigger farms. The number of sheep farms in Norway has also declined, from 28,887 in 1989–14,391 in 2015 (Statistics Norway, 2016). The decline has been concentrated among smaller farms. For example, the number of farms with less than 100 winter-fed sheep decreased by 58% between 1989 and 2015, whereas the number of farms with more than 200 sheep increased from 84 to 527 in the same period. The number of breeding sheep (ewes and rams per July 31) has been quite constant with 0.89 million in 1989 and 0.91 in 2015, while the number of lambs increased from 1.28 million in 1989–1.46 million in 2015.

Farm structural changes have been a controversial policy matter in Western societies. Historically, farm exits – and entries – have played an important role in introducing technologies and productivity growth in the agricultural sector of many countries. The shift in production has led to declining farm numbers through farm exit and consolidation. These adjustments are difficult for farm families with implications for the economic and social viability of the local communities (Lobao and Stofferahn, 2008). Fewer sheep farms, and less grazing livestock in particular, will also have consequences for maintenance of rural landscapes, biodiversity and the protection of the environment. Where sheep grazing is removed, there can be shrub encroachment, which can lead to loss of elements of landscape and biodiversity (Dýrmundsson, 2006; El Aich and Waterhouse, 1999; Ross et al., 2016).

Despite the importance of sheep farming as regards provision of ecosystem services and vibrant farming communities, few if any studies have attempted to examine why some operations exit sheep farming whereas others continue. Research from farming in general or other farm enterprises has, however, been conducted to identify a large number of factors that influence exit rates. The majority of contributions show that larger farms (Breustedt and Glauben, 2007; Dong et al., 2016; Landi et al., 2016; Susanto et al., 2010), higher profitability (Bragg and Dalton, 2004; Dong et al., 2016), and younger farmers (Bergfjord et al., 2011; Bragg and Dalton, 2004; Howley, 2015; Mishra et al., 2014) are associated with a lower likelihood of exit. Some studies have identified part-time farming as a means of stabilising a farm business (Breustedt and Glauben, 2007; Kimhi and Bollman, 1999), whereas others have reported that working off the farm increases the probability of exit (Bragg and Dalton, 2004; Goetz and Debertin, 2001; Weiss, 1997). The influence of location is also mixed. Goetz and Derbertin (2001) and Landi et al. (2016) report that a higher population density positively affects exit behaviour. In contrast, Glauben et al. (2006) argue that population density decreases exit rates.

Mental models are cognitive constructs that people use to interact with the world around them (Jones et al., 2011), and farmers'

E-mail address: ola.flaten@nibio.no

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mental models are influenced by values and knowledge and serve as a guide in learning and decision-making (Eckert and Bell, 2005). Bergfjord et al. (2011) and Howley (2015) have provided support that farmers with financial objectives are more likely to leave farming than those finding non-financial concerns such as environment, farming lifestyle, stewardship and farm labour related benefits more important.

Community-based social processes can also be engines of change. Lyson et al. (2000) found New York dairy farmers' community engagement to be negatively associated with an exit intention. Gezelius (2014) have suggested that the economic viability of modern, capital-intensive farms increases when these farms are located in multi-farm communities characterised by lasting social networks. Further, Morgan-Davies et al. (2012) found interdependencies in Scottish hill farming areas in such a way that as neighbouring farms disappear, remaining farms become less tenable.

The objective of the current study is to identify key factors influencing exit intentions in Norwegian sheep farms. The study combines accountancy and survey data collected from specialised sheep farms.

2. Materials and methods

2.1. Sample and data collection

Data used in this study come from the Norwegian Farm Business Survey (FBS) conducted by the Norwegian Institute of Bioeconomy Research (NIBIO). The FBS contains extensive details about financial condition and farm production from a sample of Norwegian farm holdings. Farms above a minimum economic size (standard gross margin) of 8 ESU (European Size Units, 1 ESU = € 1200), are eligible to become a FBS farm. The annual sample covers about 900 farms, which are selected to represent 70% of the total farm population of about 42 000 farms in Norway, 92% of the total farmland and 96% of the total agricultural gross output. The farms included in the survey are randomly selected along three dimensions: economic size, region, and type of farming (NIBIO, 2016). Around 90% of the farms remain in the sample the following year.

To obtain attitudinal and behavioural data not covered in the FBS data, a questionnaire was sent per mail in mid-March 2009 to all FBS farmers at that time. The questionnaire achieved after two reminders a response rate of 60%.

In Norway, sheep farming are based on the extensive use of free-range forest and mountain pastures in summer. Housing and feeding are required throughout the winter due to snow and frost, often for more than half of the year. Many sheep farms are located either close to mountain areas and other sparsely populated areas or along the coast, but some farms are also more centrally located.

The annual FBS data sets include around 200 farms with sheep. For the purpose of this study, farms with sheep kept in mixed farming systems of various types, for example, mixed dairy and sheep farms, were not included, making it possible to examine the effects of profitability in sheep farming on exit tendencies. This study was therefore restricted to the annually around 100 specialised sheep farms, where the majority of farm gross output came from sheep. The FBS sample of specialised sheep farms represents 46% of the total sheep population and 33% of the sheep farms in Norway (own calculation). Due to the size requirement of at least 8 ESU, specialised sheep farms with less than 40–50 breeding ewes are not included in the FBS sample. These smaller holdings account for 8% of the sheep and 18% of the sheep farms.

In this paper, data only on sheep farms participating in the FBS in both 2007 and 2008 were used. Average figures of the 2 years were used to better characterise farm differences in physical and financial performance arising from managerial abilities rather than returns from a single year, which are more random because of uncontrollable events (such as the weather). After deleting specialised sheep farms that did not respond to the questionnaire or with missing values on important variables to be used in the analysis, 59 usable observations remained.

Table 1
Description of variables and sources of data.

Variable	Description
Exit[a]	1 if the intention is to exit sheep farming on the operation within 10 years; 0 otherwise
Ownership[b]	Years (in 2008) of operator's farm ownership
Agricultural education[a]	1 for a farm household with one or more year of agricultural education, 0 otherwise
Location[c]	1 for a central location, 0 otherwise (remote)
Off-farm income[b]	Percentage of total farm household income from off-farm work
PC[b]	Profitability coefficient
ROOC[b]	Return over operating costs (NOK[d] per breeding sheep)
Solvency[b]	Equity/asset ratio (in%)
Flock size[b]	Number of breeding sheep as of March 1
Meat output[b]	Lamb and mutton produced (kg carcass weight per breeding sheep per year)
Farming goal[a]	Difference between summated scales of two components: 'non-financial' minus 'financial' farming goals; see Section 2.2.4
Local farming community[a]	Summated scale (average score) of a component that includes three individual items; see Section 2.2.5

[a] Data from the questionnaire.
[b] Data from the farm business survey.
[c] Statistics Norway (2008).
[d] € 1 ≈ NOK 8.15 in 2007/08.

2.2. Measures

Variables used in the analysis are presented in Table 1.

2.2.1. Exit intentions

Exit intentions were measured by a self-reported response to whether the operator believed the farm would be producing sheep in 10 years. The indicator = 1 was applied if the farm intended to exit sheep farming, and zero otherwise. Therefore, exit in this article means switching out of sheep production, irrespective of whether the farm exits the farming industry or takes up production of an alternative enterprise.

2.2.2. Profitability

The study focus on profitability based on both short-run and long-run rules. The exit or shut-down decision rule is based on the comparison of revenues relative to operating costs. Long-run profitability does also include returns on capital invested in the farm business and the opportunity cost of unpaid labour input, providing an indicator of whether the farm can replace capital assets and stay in business over time.

Long-run profitability was measured as the profitability coefficient (PC), defined as (Flaten et al., 2011):

$$\mathrm{PC} = \frac{\text{Net farm income}}{\text{Interest claims on total value of farm assets} + \text{opportunity cost of unpaid labour}} \times 100.$$

Here net farm income represents the return to all unpaid labour and management and to all the capital invested in the farm business. The farm asset value for the year is found by averaging the beginning and ending total asset values from the farm balance