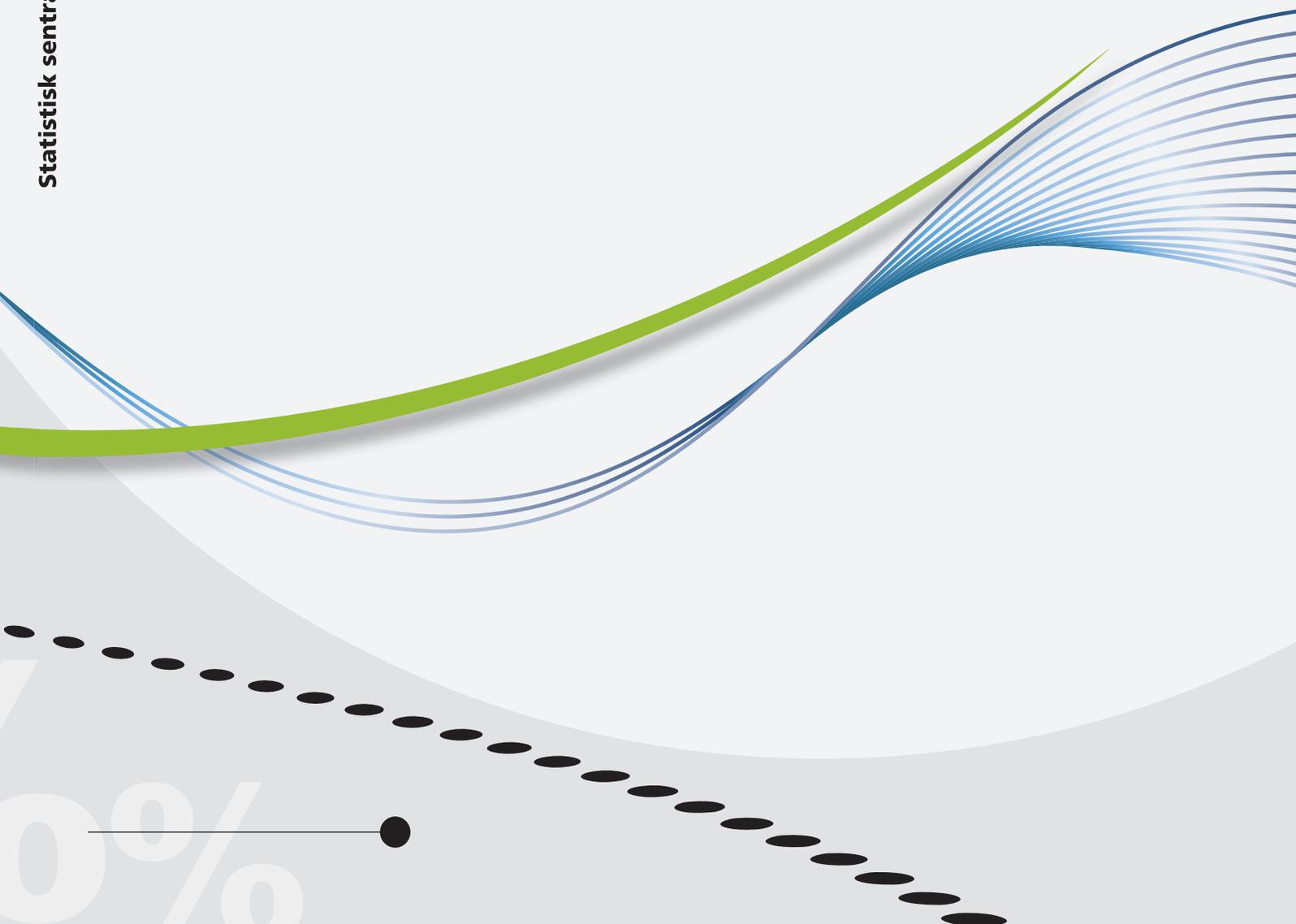


Ole Rognstad and Tora C. Löfgren

Pilot survey on land rent statistics

Report to Eurostat Directorate E



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Publisert august 2015

ISBN 978-82-537-9193-7 (elektronisk)

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Preface

The Norwegian Agriculture Agency (NAA) has been working out annual statistics on rent prices for quite many years. These statistics cover a selection of important crops and are based on expert assessments. The existing statistics do not provide the results requested by Eurostat. In July 2013, Eurostat Directorate E invited 20 Member States as well as Iceland, Liechtenstein and Norway to submit an application for the award of grant in the framework of agricultural statistics. The title was: "Data collection system for agricultural land prices and rents following the common target methodology." Eurostat accepted a grant application from Statistics Norway, and the grant agreement was signed on 13 December 2013 (Agreement number 08411.2013.001-2013.737). This report is the final report in the project to Eurostat Directorate E. This report is limited to the documentation of a survey on agricultural land rents and the possibilities of establishing an annual land rent statistics in Norway, based on the Eurostat target methodology. The survey on land prices is documented in a separate report.

Mr. Ole Rognstad, senior adviser at the Division for primary industry statistics, has prepared this report in co-operation with Mrs. Tora Löfgren, senior adviser at the Division for methods.

Statistisk sentralbyrå, 14. juli 2015.

Elisabeth Nørgaard

Abstract

Administrative data on rent prices do not exist in Norway. Statistics on this topic must either be based on direct observation and/or network of experts.

The System of Application for Governmental Production Subsidies (PRO) includes information on rented agricultural land per holding distributed on arable land, permanent grassland and unutilised land. PRO includes 99.7 per cent of the utilised agricultural land in Norway and thus is an excellent target population for surveys on rent prices.

The Norwegian Agriculture Agency (NAA) has been working out annual statistics on rent prices for quite many years. These statistics cover a selection of important crops and are based on expert assessments. The existing statistics do not provide the results requested by Eurostat.

Based on this background a pilot sample survey on agricultural land rents in 2013 was launched by Statistics Norway. The sample was drawn among holdings in PRO. After some limitations the target population amounted to 27 300 holdings and 3 002 of these were included in the gross sample. The survey was voluntary and 1 656 holdings responded, corresponding to a response rate of 55. Average renting prices were estimated at regional and country level for arable land, permanent grassland and total agricultural land respectively. Evaluated by region and type of land, the results of the survey seemed reasonable. Also comparison with the Census of Agriculture 1999 was satisfactorily.

The pilot sample survey also included renting prices for the same crops as included in the NAA survey. Average renting prices in the pilot survey were lower than the prices in the NAA statistics for all specified crops. The relative difference varied significantly by crop. Different data collection method is assumed to be the main reason for the difference in average prices between the two surveys.

After internal discussions and meeting with NAA, Statistics Norway has decided not to establish an annual survey based on direct observation. There are several reasons for this:

- Resources are scarce at Statistics Norway. Introducing new statistics would probably cause closing down of other important statistics.
- Collection of data directly from holders would increase the response burden.
- The NAA conducts a well established statistics. These statistics cover national needs beyond the Eurostat requirements, e.g. regional renting prices for selected important crops. If Statistics Norway should include these needs, resource requirements and response burden would further increase.

The Norwegian Agriculture Agency has accepted to continue the annual statistics and to take steps to adapt it to fulfil the Eurostat methodology.

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1. Introduction

1.1. Background

Rent of agricultural land could be divided into two main types:

- Rent of solely agricultural land as supplement to an already existing farm.
- Rent of a complete farm. The rent includes agricultural land, farm buildings and usually a domestic building.

In Norway, rent of agricultural land as supplement to already existing farms started in the 1950-ties. Earlier, rent of agricultural land mainly was related to rent of a complete farm. The extent of rented agricultural land has grown continuously since the 1950-ties. In 2013 the share of rented utilised agricultural land reached 44 per cent. 66 per cent of the holdings rented agricultural land in 2013. Among these holdings, about half of them rented between 1 and 49 per cent of their utilised agricultural land. The share of holdings renting the whole utilised agricultural land has decreased during this period of time. However, the reduction is small in recent years. One reason for this is a slight increase in the number of farms organised as group-holding or legal person.

Table 1 Holdings with/without rent of agricultural land and proportion of rented agricultural land. 1969, 1979, 1989, 1999, 2010 and 2013

Year	Holdings, total	Holdings without rented agricultural land	Holdings with rented agricultural land			Percentage of rented utilised agricultural land
			Total	Renting the whole agricultural land	Renting 50 - 99 % of the agricultural land	
		Per cent			Per cent	
1969	154 977	79	32 830	29	15	15
1979	125 302	69	38 901	26	17	20
1989	99 382	61	38 768	18	19	23
1999	70 740	45	38 746	15	25	31
2010	46 624	35	30 398	12	35	42
2013	43 726	34	28 809	12	37	44

Source: Statistics Norway: Census of Agriculture 1969 and 1999, Census of Agriculture and Forestry 1979, 1989 and 2010, Structure of agriculture 2013.

The Norwegian Agriculture Agency collects annual statistics on renting prices. These statistics cover a selection of important crops and are based on expert assessments. The methodology has been fairly the same up till 2013. The existing statistics do not provide the results requested by Eurostat. A further description of the statistics is given in chapter 2.1.

Statistics Norway has collected some information on rented agricultural land with paid rent and total amount paid, in the agricultural censuses in 1989 and 1999 respectively.

Table 2. Holdings which paid for rented agricultural land, area with payment and average paid rent per hectare

Year/region	Holdings with rented agricultural land		Total paid rent (excluded VAT)	Agricultural land with paid rent		
	Total	Which paid rent		Area	Per cent of total rented land	Average paid rent per hectare
1989	38 768	24 675	NOK 1000 204 236	Hectares 159 216	Per cent 69	NOK 1 283
1999	38 746	26 419	361 805	227 046	70	1 594
Region						
1 Akershus og Oslo	1 683	1 460	44 420	22 698	90	1 957
2 Hedmark og Oppland	7208	5459	86368	50 757	77	1 702
3 Sør-Østlandet	6 034	4 770	112 507	53 943	84	2 086
4 Agder og Rogaland	5 015	3 626	47 864	26 458	71	1 809
5 Vestlandet	8 732	4 455	22 154	23 723	48	934
6 Trøndelag	5 374	4 116	39 310	31 687	73	1 241
7 Nord-Norge	4 700	2 533	9 182	17 780	46	516

Source: Statistics Norway: Census of Agriculture and Forestry 1989 and Census of Agriculture 1999.

Table 2 illustrates the significant variations between Norwegian regions regarding the share of rented land with payment and thus also the average paid rent per hectare. This picture primarily reflects the natural conditions for agriculture, e.g. in Vestlandet and Nord-Norge the bulk of the area is only suitable for cultivation of coarse fodder.

In recent years, agricultural experts as well as politicians have paid increased attention to the high percentage of rented agricultural land. A significant part of this land is rented without any written agreement or on written agreements lasting less than five years¹. This situation increases the risk for the holdings renting much agricultural land, e.g. concerning investments in farm buildings and machinery. Furthermore, oral agreements and short term agreements may result in less maintenance of the agricultural land, e.g. concerning ditching, liming of the soil and bush clearing of field margins.

The Ministry of Agriculture and Food has in 2014 appointed a working group which shall assess problems related to renting of agricultural land and the duty to utilise the agricultural land (keep the land in good agricultural condition).

1.2. Objectives

The general objective of this project has been to establish a system of annual statistics on agricultural land rent prices according to the Eurostat target methodology.

The first step has been an evaluation of the existing statistics on land rent prices carried out by the Norwegian Agriculture Agency. It was assumed that these statistics do not fulfil the Eurostat methodology and either had to be amended or new statistics had to be established.

Based on this background a pilot survey on agricultural land rents in 2013 was launched by Statistics Norway.

1.3. Definitions

Holding

A single unit both technically and economically, which has single management and which produces agricultural products. The holding is independent of municipality boundaries. The agricultural holding's headquarter must be located to an agricultural property.

Utilised agricultural area

Agricultural land that is harvested at least once during a year, including planted area of permanent crops, where no harvest has been produced so far. Includes also arable land included in the crop rotation system with no intention to produce a harvest during the year, but which will be harvested the next year.

Unutilised agricultural land

Agricultural land that is no longer farmed. This land could be brought back into cultivation without extensive work. Fallow land is not included.

Arable land²

Agricultural land that has been ploughed and can still be ploughed further. The area can be used for cultivating field crops or meadow and pasture renewed by ploughing.

Surface-cultivated land

Agricultural land that is mostly cleared and levelled in such a way that it can be mechanically harvested.

¹ Source: The Census of Agriculture 1999. It is assumed that the situation is about the same nowadays.

² The Norwegian definition is applied.

Infield pastureland

Pastureland that cannot be mechanically harvested. At least 50 % of the area must be covered by grass species. The area must be fenced in unless it has natural boundaries such as rivers, lakes, sea, mountains etc. Areas of woodland, bogs, ponds and rocks each exceeding 0.1 hectares are deducted.

Permanent grassland

Permanent grassland is the sum of surface-cultivated land and infield pastureland.

Land rent

The land rent includes payment in money, payment in kind and free rent.

Region

The regional classification used in this project is according to “Statistical regions for the EFTA-countries and the Candidate countries 2008” (Eurostat Methodologies and working papers), cf. Eurofarm manual for data suppliers to the Farm Structure Survey 2013.

Table 3. Statistical regions and counties in Norway

	Statistical region	County
1	NO01 Oslo og Akershus	NO011 Oslo
		NO012 Akershus
2	NO02 Hedmark og Oppland	NO 021 Hedmark
		NO022 Oppland
3	NO03 Sør-Østlandet	NO031 Østfold
		NO032 Buskerud
		NO033 Vestfold
		NO034 Telemark
4	NO04 Agder og Rogaland	NO041 Aust-Agder
		NO042 Vest-Agder
		NO043 Rogaland
5	NO05 Vestlandet	NO051 Hordaland
		NO052 Sogn og Fjordane
		NO053 Møre og Romsdal
6	NO06 Trøndelag	NO061 Sør- Trøndelag
		NO062 Nord- Trøndelag
7	NO07 Nord-Norge	NO071 Nordland
		NO072 Troms
		NO073 Finnmark

1.4. Concepts, abbreviations and symbols used

Concepts

Decare 1 decare = 0.1 hectare = 1000 m²

Rent agreement Rent agreement refers to the identification of an agricultural property. If a holder has entered into two or more rent agreements on the same property, this is counted as one rent agreement. On the other hand, if an owner of an agricultural property rents out land to two or more holders, this is counted as one rent agreement for each of the holders concerned.

Observation Synonymous with holding

Abbreviations and symbols

.. Data not available

: Not for publication

Ha/ha hectare, 1 ha = 10 decares = 10 000 m²

NAA the Norwegian Agriculture Agency

PRO The System of Application for Governmental Production Subsidies

UAA Utilised agricultural area

2. Existing annual statistics

2.1. General description

The Norwegian Agriculture Agency works out annual statistics on renting prices per decaire for different crops cultivated on agricultural land. Data are collected from the public agricultural administration at municipal level. In 2013, somewhat over 300 municipalities of a total of 428 municipalities were contacted. The survey is voluntary and 217 municipalities responded. In the last ten years, the number of responding municipalities has been varying from about 200 to about 250.

The price information provided is based on knowledge and judgements given by the local staff. The information comprises land rent prices for six different crops. Four of these crops are further divided by land of good and poor quality. The questionnaire is as follows:

Table 4. Norwegian Agriculture Agency questionnaire on agricultural land rent prices

Average NOK per decaire per year				
If free rent, fill in 0				
Purpose of rented land	Land of good quality	Land of poor quality	Most common purpose	Payment in kind
Cultivation of grasses				
Cultivation of cereals for grain				
Cultivation of field-grown vegetables or berries				
Cultivation of potatoes				
Infield grazings				
Outfield grazings				
Comments:				

Land of poor quality is agricultural land that is poorly ditched or in general poor condition. It may also include steep land, remote located land and land of inconvenient shape or size.

The statistics are presented by six regions. Det skal stå: The regions are unequal to the statistical regions.

Table 5. Statistical regions, counties and NAA regions

	Statistical region	County	NAA region	
1	NO01 Oslo og Akershus	NO011 Oslo	Østlandet	
		NO012 Akershus		
2	NO02 Hedmark og Oppland	NO021 Hedmark		
		NO022 Oppland		
3	NO03 Sør-Østlandet	NO031 Østfold		
		NO032 Buskerud		
		NO033 Vestfold		
		NO034 Telemark		
4	NO04 Agder og Rogaland	NO041 Aust-Agder		Telemark/Agder
		NO042 Vest-Agder		
		NO043 Rogaland	Rogaland	
5	NO05 Vestlandet	NO051 Hordaland	Vestlandet	
		NO052 Sogn og Fjordane		
		NO053 Møre og Romsdal		
6	NO06 Trøndelag	NO061 Sør- Trøndelag	Trøndelag	
		NO062 Nord- Trøndelag		
7	NO07 Nord-Norge	NO071 Nordland	Nord-Norge	
		NO072 Troms		
		NO073 Finnmark		

Statistics on average land rent prices are presented for each crop at both country and regional level for land of good quality. Furthermore, NAA calculates an index based on these average prices at country level (year 2000 = 100). At regional level also lowest price and highest price are presented for each crop for land of good and poor quality respectively. All estimated figures are arithmetic averages of the municipalities responding on the crop concerned. Free rent of land is included if the municipality reports zero for the related crop.

The Norwegian Agriculture Agency has no estimates on the distribution of rented land on good and poor quality. Experience indicates that rent of land of poor quality hardly occurs for field-grown vegetables/berries and potatoes.

2.2. 2.2 Relation to the Eurostat target methodology

2.2.1 Data source

The collection of data via the local agricultural administration at municipal level is considered to be within the approved methods for data collection, namely “Statistical data collection via a network of experts”.

2.2.2 Geographical coverage

The observation unit is municipality. The municipalities could be easily reclassified from the NAA regions to the Statistical regions. However, the NAA regions are considered better adapted to the agricultural conditions in Norway, e.g. it seems strange to separate Akershus and Oslo from Sør-Østlandet.

The number of municipalities differs somewhat from one year to another. However, according to NAA the responding municipalities are quite stable and all regions are satisfactorily covered.

The average renting price per decaire is an arithmetic average of the responding municipalities. The area of agricultural land varies a lot between Norwegian municipalities, and so does area of rented agricultural land. Due to absence of a system for weighting the responding municipalities based on e.g. total agricultural land or rented agricultural land, the absolute renting price may be biased.³ Provided that the responding municipalities are quite stable over time, the changes over time would be reliable.

2.2.3 Field of observation

The renting price of one decaire of six different crops is the observation unit, see table 4.

The existing statistics provide renting price neither for arable land nor for total agricultural land. The statistics include four different crops belonging to arable land: grasses for fodder⁴, cereals etc. for grain, field-grown vegetables/berries and potatoes. In 2013, these crops amounted to 97 per cent of the arable land in Norway. The total of these crops could represent arable land, but both the size of each crop and the renting price per decaire varies a lot so a system of weighting must be introduced. Because no information of rented land by crop is available, this system for weighting must be based on the total area of each related crop.

The distribution of land on good and poor quality is not relevant to the Eurostat methodology. However, renting agricultural land of poor quality for cultivation of field-grown vegetables/berries or potatoes hardly occur. It is also assumed that the rented area of poor quality land for cultivation of cereals etc. for grain is limited. Rented poor land for cultivation of grasses is thought to be significant but decreasing because of plenty of good quality land being available for renting in many municipalities.

Permanent grassland comprised 18 per cent of the total utilised agricultural area in Norway in 2013. Thus it is relevant to include renting price for this land type. Infield grazings amounted to 89 per cent of this area, while the remaining area was surface-cultivated land. The “crop” Outfield grazing is not defined as agricultural land in Norway and thus out of scope of the land rent statistics.

The existing collected information could be allocated the following way:

³ As from 2014 the NAA has started to estimate weighted average prices. Basis for the weighting is the total rented agricultural land per municipality.

⁴ Grasses for fodder may include an insignificant area of surface-cultivated land.

- a) Arable land: Weighted average price for renting land of good quality for cultivation of grasses, cultivation of cereals for grain, cultivation of field-grown vegetables/berries and cultivation of potatoes
- b) Permanent grassland: Infield grazings

The price of agricultural land should be the weighted prices of arable land and permanent grassland. The weighting would be based on information from administrative data on rented arable land and rented permanent grassland respectively.

3. The pilot survey

Statistics Norway has in 2014 worked out a pilot survey on agricultural land rent prices following the common target methodology. The survey was conducted by the Division for primary industry statistics in co-operation with the Department of data collection and methods, particularly the Division for methods.

3.1. Population

The population was based on preliminary data for 2013. Annually, Statistics Norway compiles a population of agricultural holdings. The core of this population is the holdings applying governmental production subsidies (PRO). In addition, the population comprises a few other holdings. Information about these holdings is updated via several administrative registers. In 2013, the total number of holdings amounted to 43 525, of which 42 796 holdings applied subsidies. 1 418 of the latter had no utilised agricultural area, e.g. they performed only livestock farming. The total utilised agricultural area of the population and the applicants were 983 200 hectares and 980 600 hectares respectively. Thus only 0.3 per cent of the UAA was not included in PRO.

The holdings in PRO annually have to complete a comprehensive form with registration date 31 July. Among the required information is a list of all agricultural properties included in the holding's agricultural area. For each property, the following shall be reported: name of owner, identification variables of the property and rented agricultural land distributed on arable land, surface-cultivated land, infield pastureland and unutilised agricultural land. Linking of properties in PRO with the Cadastre identifies which properties are owned by the holder and/or the holder's spouse. The remaining properties are considered to be rented in relation to the holder.

Holdings in PRO classified as group-holding or legal person amounted to 2 240 holdings included those without utilised agricultural area. These holdings were left out of the population. Group-holdings frequently rent agricultural land from their partners and the price for this land may often differ from the market price. The same applies to some of the legal persons. Both types of holdings may additionally rent agricultural land at market price from other agricultural properties. This rent is considered not to differ from the rent performed by holdings operated by a natural person. After these limitations the target population amounted to 27 274 holdings with one or more rent agreements.

In 2010 the irrigable agricultural land amounted to 9 per cent of the UAA in Norway. Thus it is not relevant to collect separate price information for irrigable and non-irrigable land. However, experience indicate that available irrigation significantly influence the rent, particularly for land suitable for vegetables/berries or potatoes.

3.2. The Sampling Plan

A stratified random sample of $n = 3\,002$ agricultural holdings was drawn from the target population. The sample was stratified by the size of the rented area, which is known to correlate with rental price. The rented area is a register variable, hence we know its value for all units in the target population. Optimal allocation was used to allocate the sample units to minimize the rental price variance. The sampling plan was tested with register data from 2012 and different classifications for the rented area were tried out in several test samples before the final plan was established. The final plan contained the 7

statistical regions and 5 classes of rented area (from 2013 PRO), i.e. a total of 35 strata indexed in table 6.

Table 6. Indexation of strata

Statistical region	Rented agricultural land in decares				
	1-49	50-149	150-399	400-799	800-
1 Oslo og Akershus	11	12	13	14	15(<i>t</i>)
2 Hedmark og Oppland	21	22	23	24	25(<i>t</i>)
3 Sør-Østlandet	31	32	33	34	35(<i>t</i>)
4 Agder og Rogaland	41	42	43	44	45(<i>t</i>)
5 Vestlandet	51	52	53	54	55(<i>t</i>)
6 Trøndelag	61	62	63	64	65(<i>t</i>)
7 Nord-Norge	71	72	73	74	75(<i>t</i>)

The largest agricultural holdings, marked with a “*t*” in the table are separated from this indexation because all agricultural holdings in the target population were chosen from this stratum. This was decided on after having ended up with $n_{kh} > N_{kh}$ for this stratum for different classifications of size (area) and ways to allocate the sample.

For the other strata, kh ($k=1, 2, \dots, 7$ and $h=1, \dots, 4$) n_{kh} units were selected randomly and allocated by optimal (Neyman) allocation:

$$n_{kh} = n \frac{N_{kh} S_{ykh}}{\sum_k \sum_h N_{kh} S_{ykh}}$$

where

$n = \sum_k \sum_h n_{kh}$ = the sample size

S_{ykh}^2 = the population variance for the rental price in stratum kh

N_{kh} = the number of units in the population for stratum kh

Furthermore, since we did not know S_{ykh}^2 , we had to substitute it with the variance of the allocation variable (rented area) S_{xkh}^2 , we get a *x-optimal allocation*. The sample coverage in per cent of the population is shown in table 7.

Table 7. Sample coverage in per cent of population

Statistical region	Rented agricultural land in decares				
	1-49	50-149	150-399	400-799	800-
1 Oslo og Akershus	3	8	19	29	100
2 Hedmark og Oppland	4	7	17	28	100
3 Sør-Østlandet	3	8	18	28	100
4 Agder og Rogaland	3	7	17	26	100
5 Vestlandet	3	7	16	24	100
6 Trøndelag	4	7	18	25	100
7 Nord-Norge	4	7	17	25	100

3.3. Questionnaires

Three different questionnaires based on a common core of questions were created:

- 1) Questionnaire for holdings with one or two rent agreements
- 2) Questionnaire for holdings with three or four rent agreements
- 3) Questionnaire for holdings with five or more rent agreements, maximum eight agreements

Due to lack of resources, no electronic versions of the questionnaires were prepared, only paper versions were available.

The questionnaires were pre-printed with rented areas distributed on arable land, surface-cultivated land, infield pastureland and unutilised agricultural land for each rent agreement (agricultural property). Four questions were asked for each rent agreement:

1 What does the rent agreement include?

- Solely rent of agricultural land (supplementary land)
- Tenancy of an agricultural property with agricultural land and buildings

2 Was rented agricultural land in 2013 paid in money or in kind?

- Yes → Payment in money
 Payment in kind, e.g. snow clearing, fuel wood or maintenance of fences
- No payment, the land was used free

3 What were the total rental expenses in 2013 distributed on the following land types? Include an estimate of the value of payment in kind.

- Arable land |_____| NOK excl. VAT
- Surface-cultivated land |_____| NOK excl. VAT
- Infield pastureland |_____| NOK excl. VAT
- Total |_____| NOK excl. VAT

4 What were the rented area and the total rental expenses for the following crops?

- Cereals and oil-seeds for grain |_____| decares |_____| NOK excl. VAT
- Potatoes |_____| decares |_____| NOK excl. VAT
- Field-grown vegetables and berries |_____| decares |_____| NOK excl. VAT
- Grasses and grazing on arable land |_____| decares |_____| NOK excl. VAT
- Other crops on arable land |_____| decares |_____| NOK excl. VAT

3.4. Response rate

The survey was voluntary. To promote response, two gift vouchers were drawn among the respondents. The questionnaires were submitted to the respondents in March/April 2014. Two reminders were sent, respectively in early May and late June. The period of data collection was behind the time table and not favourable for the respondents due to spring work. In addition, in the same period some of the respondents were imposed to complete the annual Sample Survey of Agriculture. These could be reasons for the relatively low response rate of 55 per cent. At regional level, the lowest response rates were in Nord-Norge (48 %) and Vestlandet (49 %). In these two regions a majority of the rent agreements were free rent in 2013. Highest response rates were in Oslo and Akershus (62 %) and Trøndelag (61 %). Oslo and Akershus had the lowest percentage free rent agreements in 2013, while Trøndelag had an average percentage free rent agreements. Distributed by size of rented agricultural land, the response rates varied between 54 and 61 per cent. The response rates were highest for holdings renting 1-49 decares and holdings renting at least 800 decares. The response rates are shown as percentage shares of the gross sample in table 8.

Table 8. Net sample in per cent of gross sample

Statistical region	Rented agricultural land in decares					Total for Statistical regions
	1-49	50-149	150-399	400-799	800-	
1 Oslo og Akershus	64	63	58	68	62	62
2 Hedmark og Oppland	65	55	51	50	71	56
3 Sør-Østlandet	55	55	59	63	60	59
4 Agder og Rogaland	51	58	46	48	70	51
5 Vestlandet	50	49	51	39	20	49
6 Trøndelag	61	59	63	72	46	61
7 Nord-Norge	64	46	49	38	47	48
The whole country	57	54	54	56	61	55

3.5. Editing

The questionnaires were optically read by the Department of data collection and methods. Staff at the Division for primary industry statistics created computerized controls in DYNAREV (a standardized tool created in Statistics Norway). The editing was finished in early September.

The editing brought to light an unfavourable design of the questionnaire. For the first rent agreement, the questions 1-3 were placed at page one, while question 4 was at page 2. This caused confusion for some respondents. Furthermore, quite many of the respondents who tick “yes” for payment in kind did not report an estimated value for that item. Some respondents reported rent per decare instead of total rental expenses. This type of error was easy to detect. However, an overall conclusion was that few questionnaires were perfectly filled in.

3.6. Estimation (including non-response weights)

The net sample of 1 656 observations was reviewed and checked for reporting errors and suspected outliers. Values were manually examined against the paper questionnaire and accessible registry data. Some simple imputations were made; rents without payment with missing values on payment were imputed with a 0. Also, some observations had to be deleted; e.g. area rented cannot take the value 0 or missing in calculations. The questionnaire collected data for a maximum of 8 rent agreements, but we know from the register that farmers could have far more agreements than that, which means that we lost some information. Weighting with population figures probably corrects for parts of this loss. We used register data from 2013 in the weighted average price formulas. Rents are estimated with and without free rent respectively. Excluding free rent means that we remove all agreements with reported renting price = 0 when we calculate rental price.

3.6.1 Average rental price for one hectare cultivated land including free rents

First the average price per agricultural holding is calculated for the reference year:

$$m_j = \frac{\sum_i s_{ij}}{\sum_i a_{ij}} \quad j = 1, 2, \dots, n$$

where

m_j = the average rental price per hectare for holding j the reference year

s_{ij} = payment for agreement i unit j in the reference year

a_{ij} = area rented in agreement i unit j in the reference year

Then the average hectare price for each stratum kh is calculated by taking the sum of all average hectare prices for the holdings within the stratum, divided by the number of holdings in the stratum:

$$y_{kh} = \frac{\sum_j m_{jkh}}{n_{kh}} \quad k = 1, 2, \dots, 7 \quad h = 1, 2, \dots, 5$$

where

y_{kh} = the average rental price per hectare for region k area class h in the reference year

m_{jkh} = the average rental price for business j in region k area class h in the reference year

n_{kh} = the number of responding holdings in region k area class h

We have five area classes and seven regions, so the average price per region is a weighted average calculated as

$$z_k = \frac{\sum_h y_{kh} a_{kh}}{\sum_h a_{kh}} \quad k = 1, 2, \dots, 7$$

where

z_k = the average rental price per hectare for region k the reference year

y_{kh} = the average rental price per hectare for region k area class h the reference year

a_{kh} = the total rented area from PRO 2013 in region k area class h the reference year

To calculate the average price for the whole country we took the sum over both area classes and regions:

$$\hat{y} = \frac{\sum_k \sum_h y_{kh} a_{kh}}{\sum_k \sum_h a_{kh}}$$

where

\hat{y} = the average rental price for the whole country the reference year

y_{kh} = the average rental price per hectare for region k area class h in the reference year

a_{kh} = total rented area from PRO 2013 region k area class h the reference year

3.6.2 Weighting prices together

We calculate the average prices per hectare for arable land and permanent grassland respectively. The average hectare price for agricultural land is a weighted sum of the land types mentioned above. The formula for weighing together two average prices is as follows

$$p_w = \frac{Ap_a + Bp_b}{A + B}$$

where

p_w = the average hectare price for agricultural land

p_a = the average price per hectare land type a

p_b = the average price per hectare land type b

A = total area land type a in the population (PRO 2013)

B = total area land type b in the population (PRO 2013)

3.6.3 Share of rent agreements with free rent

We start by calculating the proportion for all strata

$$g_{kh} = \frac{\sum_j x_{jkh}}{\sum_j t_{jkh}} \quad k = 1, 2, \dots, 7 \quad h = 1, 2, \dots, 5$$

where

g_{kh} = the proportion of free rent agreements region k area class h

x_{jkh} = the number of free rent agreements (1-8) for holding j region k area class h

t_{jkh} = the total number of rent agreements in the survey (1-8) for holding j region k area class h

For each region a weighted proportion is calculated:

$$v_k = \frac{\sum_h n_{kh} g_{kh}}{\sum_h n_{kh}} \quad k = 1, 2, \dots, 7 \quad h = 1, 2, \dots, 5$$

where

v_k = the proportion of free rent agreements in region k

n_{kh} = the number of responding holdings in region k area class h

g_{kh} = the proportion of free rent agreements in region k area class h

So, for the whole country we finally get:

$$v = \frac{\sum_k \sum_h n_{kh} g_{kh}}{\sum_k \sum_h n_{kh}}$$

where

v = the proportion of free rent agreements in Norway

n_{kh} = the number of responding holdings in region k area class h

g_{kh} = the proportion of free rent agreements in region k area class h

3.6.4 Weighting for non-response

For the formulas used in calculations, a simple way of weighing for bias due to non-response is to use the following weight derived from the formulas used in the calculations for the average prices:

$$w_{jkh} = a_{kh} / n_{kh}$$

where

w_{jkh} = the weight for holding j region k area class h

a_{kh} = total rented area in population (PRO 2013) in region k area class h

n_{kh} = the number of responding holdings in region k area class h

4. Results

Chapter 4.1 is divided in two sub-chapters; standard error and comparison with Census 1999. In chapter 4.2 results from the survey is compared with the statistics carried out by the Norwegian Agriculture Agency. Detailed results from this comparison are presented in tables A1-A4 in annex A.

4.1. Results according to Eurostat specifications

4.1.1 Standard error

Table 9 shows figures for arable land, permanent grassland and agricultural land (UAA) by Statistical region. Average renting price per hectare, including free rent, relative standard error and number of observations (holdings) are presented for each region and the whole country. The following applies to the relative standard error⁵: the relative standard error should be used with caution as it is intended for the average price for a holding at regional level, and not the region prices shown in the table. Region prices presented in the table contain population figures in the calculations, hence the relative standard error is a rough measure that is probably slightly too high.

The relative standard error at country level is 3.2 per cent for arable land. The relative standard error is less than 10 per cent for five out of seven regions. Both Vestlandet and Nord-Norge have relative standard error of about 13 per cent. One reason for this could be that the renting price are low or zero for a significant number of rent agreements in these regions, cf. table 11.

The permanent grassland shows surprisingly high relative standard error; 11.5 per cent for the whole country and varying from 12 to 36 per cent for the regions. Again, Vestlandet and Nord-Norge have the highest percentages. The reason is probably a significant number of rent agreements with low or zero renting prices in all regions.

⁵ The relative standard error is simply the standard error for the estimate divided by the estimate, expressed as a percentage.

Table 9. Pilot survey. Average renting price, included free rent, of arable land, permanent grassland and total agricultural land. 2013

Statistical region	Arable land			Permanent grassland			Total agricultural land
	Average price in NOK per ha	Rel. Standard error in per cent	No of observations (holdings)	Average price in NOK per ha	Rel. Standard error in per cent	No of observations (holdings)	Average price in NOK per ha
1 Oslo og Akershus	2 506	8,8	136	528	31,8	21	2 393
2 Hedmark og Oppland	2 116	6,0	333	501	16,2	70	1 942
3 Sør-Østlandet	2 572	5,1	345	452	23,3	59	2 413
4 Agder og Rogaland	2 048	9,5	163	899	12,5	106	1 621
5 Vestlandet	696	12,7	215	462	36,5	130	618
6 Trøndelag	1 662	6,1	254	602	16,0	91	1 528
7 Nord-Norge	451	13,3	141	192	35,8	56	408
The whole country	1 827	3,2	1 587	561	11,5	533	1 611

Table 10. Pilot survey. Average renting price, excluded free rent, of arable land, permanent grassland and total agricultural land. NOK. 2013

Statistical region	Arable land; average price per hectare	Permanent grassland; average price per hectare	Total agricultural land; average price per hectare
1 Oslo og Akershus	2 565	528	2 448
2 Hedmark og Oppland	2 250	837	2 098
3 Sør-Østlandet	2 698	716	2 550
4 Agder og Rogaland	2 458	1 166	1 978
5 Vestlandet	1 150	1 377	1 226
6 Trøndelag	1 798	883	1 682
7 Nord-Norge	653	449	618
The whole country	2 022	1 019	1 851

Table 11. Pilot survey. Percentage rent agreements with free rent. 2013

Statistical region	Percentage share
1 Oslo og Akershus	16
2 Hedmark og Oppland	30
3 Sør-Østlandet	25
4 Agder og Rogaland	39
5 Vestlandet	67
6 Trøndelag	32
7 Nord-Norge	62
The whole country	37

4.1.2 Comparison with the Census of Agriculture 1999

A comparison is made with results of the census in 1999. However, one should bear in mind that the census comprised many subjects, while the Pilot survey in 2013 focused solely on renting of agricultural land.

Table 12. Average renting price of utilised agricultural land, included free rent. 1999 and 2013

Statistical region	Census 1999		Pilot survey 2013	
	Average renting price, NOK	Relative distribution, the whole country = 100	Average renting price, NOK	Relative distribution, the whole country = 100
1 Oslo og Akershus	1 768	158	2 393	149
2 Hedmark og Oppland	1 317	118	1 942	121
3 Sør-Østlandet	1 747	156	2 413	150
4 Agder og Rogaland	1 285	115	1 621	101
5 Vestlandet	453	41	618	38
6 Trøndelag	900	81	1 528	95
7 Nord-Norge	236	21	408	25
The whole country	1 117	100	1 611	100

If the regions are sorted in ascending order by percentage points there is only one difference from 1999 till 2013. In 1999, Akershus and Oslo is number one and Sør-Østlandet number two. In 2013, the two regions have changed places. In both years, it is “close race” between them. The ranking is as expected. Oslo and Akershus is a small lowland region with fairly good agricultural conditions. Also in Sør-Østlandet most of the agricultural land is located in areas with fairly good conditions. Hedmark and Oppland, Agder and Rogaland and Trøndelag are mixed regions. The agricultural conditions in Vestlandet and Nord-Norge are mainly less good than in the other regions.

Table 13. Percentage rented agricultural land with free rent in 1999 and percentage rent agreements with free rent in 2013

Statistical region	Percentage share in 1999 (area)	Percentage share in 2013 (agreements)
1 Oslo og Akershus	10	16
2 Hedmark og Oppland	23	30
3 Sør-Østlandet	16	25
4 Agder og Rogaland	29	39
5 Vestlandet	52	67
6 Trøndelag	27	32
7 Nord-Norge	54	62
The whole country	30	37

The first column is estimated on areas and the second one on the number of rent agreements. Thus the two columns are not fully comparable. One should bear in mind that rent agreements comprising small areas are probably more frequently free than rent agreements comprising large areas.

If the regions are sorted in ascending order by percentage points there is only one difference from 1999 till 2013. In 1999, Nord-Norge is number one and Vestlandet number two. In 2013, these two regions have changed places. The ranking is as expected and is connected to agricultural conditions in the same way as the average renting prices.

4.2. Other results

The survey comprised questions on rented area and rental expenditures for some selected crops. These crops were:

- Cereals and oil-seeds for the production of grain
- Potatoes
- Field-grown vegetables and berries
- Grasses and grazing on arable land

The aim was to compare results from the pilot survey with statistics presented by the Norwegian Agriculture Agency (NAA).

Table 14. Pilot survey and NAA statistics. Average renting price per ha for selected crops in 2013. NOK

Crop	Pilot survey		NAA survey	
	Included free rent	Excluded free rent	Land of good quality	Land of poor quality ⁶
Cereals and oil-seeds for grain	2 857	2 880	3 100	1 000 - 1 950
Potatoes	3 279	3 279	4 530	..
Field-grown vegetables and berries	3 833	3 833	6 750	..
Grasses and grazing on arable land	1 331	1 481	2 160	250 - 1 710
Other crops on arable land	2 400	2 400
Permanent grassland	561	1 019	610	..

Further in this text price in the pilot survey refers to average price included free rent. Price in the NAA survey refers to average price (included free rent) of land of good quality.

4.2.1 Cereals and oil-seeds for grain

The pilot survey covered 633 observations (holdings), of which 2.5 per cent were free rent. The relative standard error at country level was 3.2 per cent. The bulk of the grain production is located to four regions. The number of observations in these regions varied from 104 to 239 and the relative standard error from 3.9 to 10.0 per cent.

At country level, the average price in the pilot survey amounted to 92 per cent of the NAA survey. The difference might be explained by the limitation of the NAA price to land of good quality. Trøndelag is the only region of the four which is equally defined in the two surveys. Here, the average pilot price

⁶ Renting of land of poor quality for potatoes, vegetables or berries hardly exists. NAA has not calculated average renting price at country level for cereals and oil-seeds together with grasses and grazing on arable land. The figures presented are the lowest and highest average price reported at municipal level.

amounted to 97 per cent of the NAA price. In the regions 1, 2 and 3, the average pilot price amounted to 90 per cent or lower of the NAA price for Østlandet. In these regions, specialized grain and oil-seed production is more frequent than in Trøndelag, and thus perhaps somewhat more land of poor quality is used for cereals and oil-seeds for grain.

4.2.2 Potatoes

The pilot survey covered 86 observations, of which only one was free rent. The relative standard error at country level was right under 10 per cent. 45 of the observations were in region 2 Hedmark and Oppland, but the relative standard error was as high as 17.8 per cent in this region. The region covers 47 per cent of the potato area in Norway.

At country level, the average price in the pilot survey amounted to only 72 per cent of the NAA survey price. The difference could hardly be explained by the limitation of the NAA price to land of good quality. According to NAA, renting land of poor quality for cultivation of potatoes is insignificant. In Hedmark and Oppland the average price amounted to only 69 per cent of the average price for Østlandet in the NAA survey. The corresponding percentage for Sør-Østlandet, the region with the second biggest potato area, was 88 per cent.

4.2.3 Field-grown vegetables and berries

The Pilot survey covered only 34 observations at country level, none of them with free rent. The relative standard error was 15.2 per cent. All regions had less than 20 observations. Region 3 Sør-Østlandet had most observations (18) and the relative standard error was 9.3 per cent. This region covers 50 per cent of the area of vegetables and berries in Norway.

At country level, the average price in the pilot survey amounted to only 57 per cent of the average price in the NAA survey. As for potatoes, NAA assumes that renting land of poor quality for cultivation of vegetables or berries is insignificant. In Sør-Østlandet the average price amounted to 68 per cent of the average price for Østlandet in the NAA survey.

4.2.4 Grasses and grazing on arable land

The pilot survey covered 1 089 observations, of which 14 per cent was free rent. At country level, the relative standard error was 3.8 per cent. All regions had at least 20 observations. In four of the regions (2, 3, 4 and 6), the relative standard error was less than 10 per cent. In the remaining regions, the relative standard deviation was between 11 and 13 per cent.

At country level, the average price in the pilot survey amounted to only 62 per cent of the price in the NAA survey. Regarding cultivation of grasses and grazing, it is likely that rented land of poor quality is significant. NAA has not presented the average price for poor quality land at country level. However, for the NAA regions in 2013, the average prices were between 39 and 47 per cent of the average prices for land of good quality. NAA has no estimates on the distribution of land between good and poor quality.

At regional level, the difference in average price is smallest in Trøndelag and Nord-Norge. In the remaining regions the average prices in the pilot survey are closer to the prices for land of poor quality in the NAA statistics.

4.2.5 Other crops on arable land

The Pilot survey covered 49 observations at country level, none of them with free rent. The relative standard error was 13.9 per cent. All regions had less than 20 observations. NAA does not collect information on this type of land.

4.2.6 Permanent grassland⁷

The pilot survey covered 533 observations, of which 11 per cent was free rent. At country level, the relative standard error was 11.4 per cent. The average price in the pilot survey amounted to 92 per cent of the NAA survey. For this crop NAA does not differ between land of good and poor quality.

All regions had at least 20 observations. The relative standard error varied between 12 and 37 per cent. Compared with the NAA survey, the average price in the pilot survey is lower in the regions 1, 2, 3 and 5, at the same level in region 4 and higher in regions 6 and 7.

4.3 Summary

The NAA statistics distinguish between rented land of good and poor quality. This classification does not apply in the pilot survey. Average prices per hectare in the pilot survey are lower than the average prices in the NAA statistics for all crops. The relative difference is smallest for cereals/oil-seeds crops for grain and permanent grassland and biggest for potatoes and field-grown vegetables/berries, even though the latter crops are hardly cultivated on land of poor quality. There is also a significant difference for cultivation of grasses and grazing on arable land. In this case, land of poor quality may be of importance.

Different data collection method is assumed to be the main reason for the difference in average prices between the two surveys. One hypothesis might be that free rent is somewhat underestimated in the NAA statistics. A weak point of the NAA statistics for 2013 is the absence of weighting data at municipal level. On the other hand, the pilot survey sample was rather small, and particularly potatoes and field-grown vegetables/berries had few observations.

5. Recommendation on future statistics

Administrative data on rent prices do not exist in Norway. Statistics on this topic must either be based on data collection from holders renting agricultural land and/or from a network of experts. It is assumed unreasonable to run two annual statistics covering the same topic.

The Norwegian Agriculture Agency (NAA) runs a well-established statistics based on data collection from the agricultural administration at municipal level. As from 2014, NAA has taken steps to adapt more to the Eurostat methodology by introducing weighting of the estimated prices by means of total rented agricultural land per municipality. This type of weighting, based on administrative data, is also possible to do on statistics for previous years. Furthermore, NAA assumes it is possible to estimate reliable average prices on arable land and total utilised agricultural land respectively, derived from the crops included in the existing survey. NAA intends also to be more active in reminding municipalities to respond.

There are several reasons for Statistics Norway not to establish an annual survey based on data collection directly from holders:

- Resources are scarce at Statistics Norway. Introducing new statistics would probably cause closing down of other important statistics.
- Collection of data directly from holders would increase the response burden.
- The NAA conducts a well-established statistics. These statistics cover national needs beyond the Eurostat requirements, e.g. regional renting prices for selected important crops. If Statistics Norway should include these needs, resource requirements and response burden would further increase.

In a meeting between the NAA and Statistics Norway, NAA has accepted to continue the annual statistics and adapted it to fulfil the Eurostat methodology.

⁷ Permanent grassland in the pilot survey is compared with cultivated grazing in the NAA survey. The pilot survey may include a small area of grasses for mowing.

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Appendix A: Tables

Table A1.1 Average renting price per ha for cereals and oil-seeds for grain in 2013. Pilot survey and NAA statistics. NOK

Statistical region	Pilot survey		NAA region	NAA survey	
	Included free rent	Excluded free rent		Land of good quality	Land of poor quality
1 Akershus og Oslo	2 642	2 671	Østlandet	3 360	1 950
2 Hedmark og Oppland	3 018	3 045			
3 Sør-Østlandet	3 040	3 054			
4 Agder og Rogaland	:	:	Telemark/Agder	2 170	1 010
			Rogaland	4 850	3 000
5 Vestlandet	:	:	Vestlandet	1 920	1 000
6 Trøndelag	2 521	2 543	Trøndelag	2 600	1 340
7 Nord-Norge	:	:	Nord-Norge	:	:
The whole country	2 857	2 880	The whole country	3 100	..

Table A1.2 Average renting price per ha for grasses and grazing on arable land in 2013. Pilot survey and NAA statistics. NOK

Statistical region	Pilot survey		NAA region	NAA survey	
	Included free rent	Excluded free rent		Land of good quality	Land of poor quality
1 Akershus og Oslo	1 849	1 849	Østlandet	2 840	1 310
2 Hedmark og Oppland	1 567	1 653			
3 Sør-Østlandet	1 791	1 914			
4 Agder og Rogaland	2 197	2 389	Telemark/Agder	1 570	610
			Rogaland	3 680	1 710
5 Vestlandet	731	1 011	Vestlandet	1 810	750
6 Trøndelag	1 443	1 537	Trøndelag	1 600	730
7 Nord-Norge	537	688	Nord-Norge	640	250
The whole country	1 331	1 481	The whole country	2 160	..

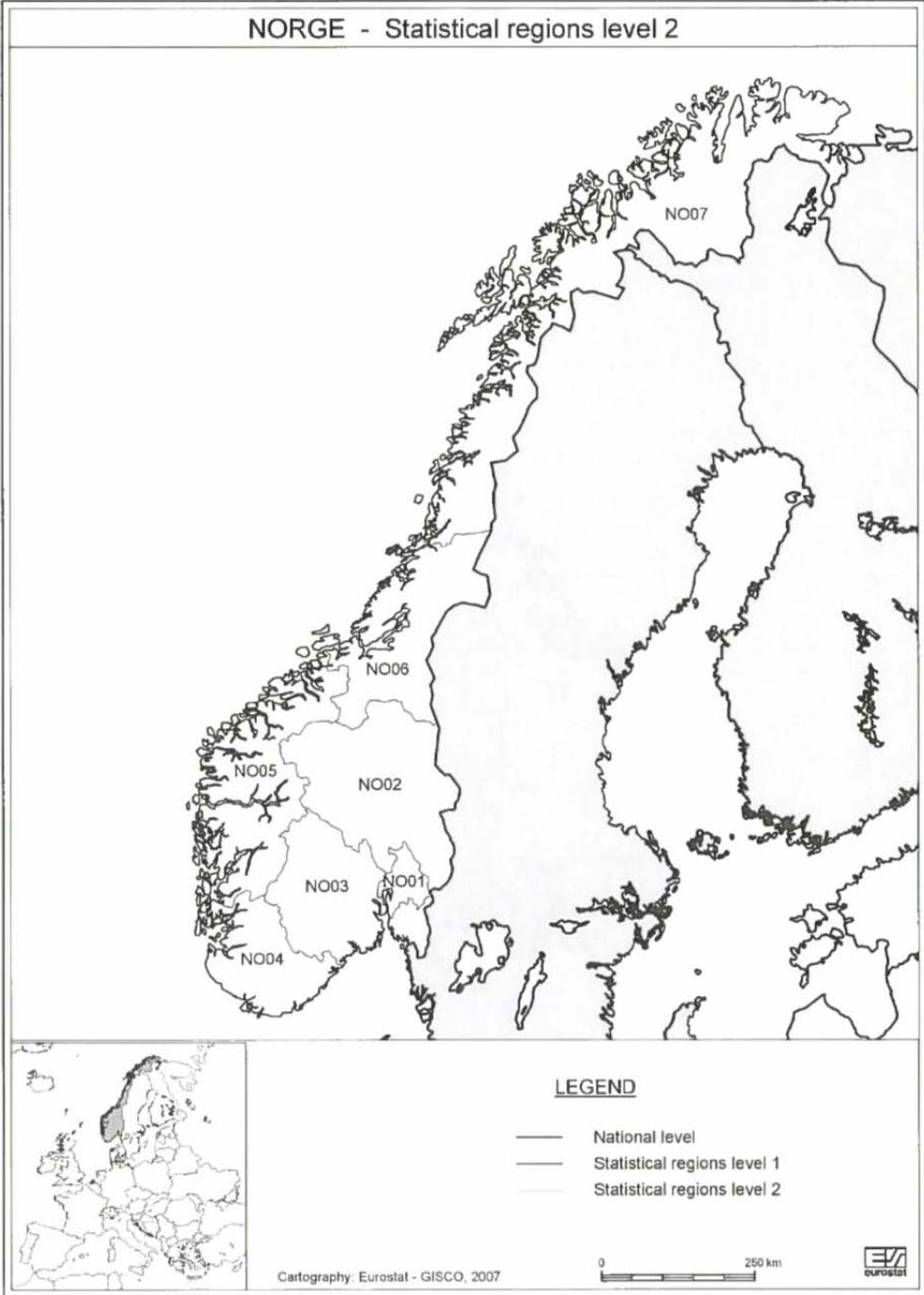
Table A1.3. Average renting price per ha for selected crops on arable land in 2013. Pilot survey and NAA statistics. NOK

Crop	Pilot survey		NAA survey	
	Included free rent	Excluded free rent	Land of good quality	Land of poor quality
Potatoes	3 279	3 279	4 530	:
Field-grown vegetables and berries	3 833	3 833	6 750	:
Other crops on arable land	2 400	2 400

Table A1.4 Average renting price per ha for permanent grassland in 2013. Pilot survey and NAA statistics. NOK

Table 4. Average renting price per ha for permanent grassland in 2013. Pilot survey and NAA statistics. NOK					
Statistical region	Pilot survey		NAA region	NAA survey	
	Included free rent	Excluded free rent		Land of good quality	Land of poor quality
1 Akershus og Oslo	528	528	Østlandet	740	
2 Hedmark og Oppland	501	837			
3 Sør-Østlandet	452	716			
4 Agder og Rogaland	899	1 116	Telemark/Agder	350	
			Rogaland	1 140	
5 Vestlandet	462	1 377	Vestlandet	630	
6 Trøndelag	602	883	Trøndelag	500	
7 Nord-Norge	192	449	Nord-Norge	160	
The whole country	561	1 019	The whole country	610	

Annex B: Map with statistical regions in Norway



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ISBN 978-82-537-9193-7 (elektronisk)



Statistisk sentralbyrå
Statistics Norway