

Tilväxtpotentialer i den norska och den svenska hästsektorn ur ett nationellt och regional perspektiv (Economic growth potential in the Norwegian and Swedish equine sectors in a national and regional perspective)

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1-Introduction

This final report provides an account of the various activities and tasks that were performed within the research project entitled “Economic growth potential in the Norwegian and Swedish equine sectors in a national and regional perspective”¹. Although there are both similarities and differences between the equine industries of Norway and Sweden, the purpose of the research project is to identify the critical and common factors for profitability and success, which will be important for a sustainable and continued growth of the industry in both countries. To achieve this overall goal, the following four research areas and associated work packages (WPs) were suggested for investigation: 1) Critical factors for successful development of horse activities at farm level (WP1), 2) Market analysis of the demand for horse-related recreational activities and equine services (WP2), 3) Economic impacts of equine sectors at national and regional levels (WP3), and 4) The future of the horse industry in society – synthesis and conclusions (WP4).

In terms of undertaking the various empirical works that were part of these four WPs, it has been necessary to proceed by dividing the research project into two periods. The first one which took place during the first eighteen months of the project aimed at taking stock of the existing and past studies on the horse sector but also to develop relevant databases that would be used in the various empirical works/tasks which are part of the four WPs. The second period which covers the rest of the project life was devoted to the development and implementation of the various empirical works/tasks. The rest of this final report is structured in such a way that it first discusses the databases that were developed. Then the various empirical WP works/activities are summarized in terms of methods being used (section 3) and produced results (section 4). Section 5 provides an account of all dissemination activities that took place during the life of the project but indicate some planned dissemination activities in the near future.

2- Data

From the outset, it was realized that data on the horse industry in Norway and Sweden were either difficult to obtain or not usable for the purposes of this research project². This state of affairs led us to devote significant resources and time to develop and construct databases on the various segments of the equine industry in Norway and Sweden. As a result, we undertook micro-surveys but also use some existing databases such Household surveys and professional

¹ This project which started in April 2010 for a period of three years until May 2012 has been extended several times with a necessity to submit this final report by May 2014.

² For instance, in the case of Sweden, a national survey on horse population was initiated in 2012 by Jordbruksverket by sending questionnaires to horse owners. Unfortunately, the information contained in this survey was not usable because it did not contain economic information such as costs, prices, etc...

databases such the one referring to trotting in Sweden. These micro surveys had to be conducted differently in Norway and Sweden.

In Norway, a survey was sent to 985 horse related enterprises. The addresses of the enterprises were found at the Brønnøysundregistered/Norwegian Company registration information service. Of these 617 were registered as “breeders of horses or animals of the horse family”. The rest (368) were companies registered in different sectors³ that had horse-related company names (horse, stable, riding, rider). This survey asked what type of horse related activity the company was running, how many horses the company owned, and if it was willing to answer a larger questionnaire about the horse sector. In this survey 308 answers were received, out of which 103 said they were not horse companies, which indicates that many companies registered as breeders are in fact not so, probably due to mistakes made by the company registration information office. Questionnaires were sent to the 189 who had said they were willing to answer, 150 via e-mail and 49 via ordinary mail. Of these 115 answers were received, 105 electronic and 10 on paper. Some of these answers were very incomplete.

In Sweden, a different approach to develop these micro-surveys was adopted. Indeed, it was decided that an appropriate questionnaire will be sent to trotters, breeders and riding schools. Concerning trotters, after having conducted a pilot and having received few replies, it was decided to use directly the professional database which provides relevant economic data on all trotter firms in Sweden that are incorporated⁴. The data regarding the breeders is based on cross-sectional survey data collected in Sweden during spring 2011. Addresses to the breeders were collected in cooperation with The Swedish Breeder Association and their member organization. The Survey was sent to 862 breeders all over Sweden. 226 of those were returned, which gives a response rate of approximately 26 percent. However, certain questions have unfortunately a lower response rate. We assume that these question were either too tedious to complete or the respondent has not fully understood the question. Nevertheless, the vast majority of the questions are answered by all 226 breeders. Concerning riding schools, a questionnaire made up of 44 questions was sent during the spring in 2011 to managers of 350 riding schools spread all over the country. The survey contained questions regarding background of the manager, structure and size of the particular riding school, some brief information about the costumers of the particular riding school, employment conditions, determinants for decision making and finally economic data from the riding school. A response rate of 97 riding schools was obtained with answers provided to all the 44 questions.

A micro-survey on clients of riding schools was also conducted using 13 riding schools located in the counties of Stockholm, Uppsala and Gävleborg in the middle regions in Sweden. These counties had been pre-selected because the district covers both Northern and Southern parts of Sweden and also gives a good spread of both urban and rural areas. This survey was handed out,

³ These different sectors concern “other sport activities”, “teaching of sport and recreation”, “other social services without accommodation”, “adventure activities”, “services related to domestic animals”, “management of sport construction” and “other leisure activities”.

⁴ These data on incorporated trotters/trainers were obtained from the Swedish Companies Registration Office which collects income statements of all limited companies operating and located in Sweden. This data information is, as a public governmental document, open for public access. Out of the 400 professional trotters/trainer companies operating in Sweden, 97 of them are limited/incorporated. We have obtained their income statements for the period 2009-2011.

on site at the 13 different riding schools, to all members taking part in riding school activities that particular evening. If the rider was under the age of 18, the survey was given to the accompanying parent. A total of 349 riding school members participated, which corresponds to a response rate of about 97 percent. The survey questions mainly concerned the riders' willingness to pay for riding lessons and their households' total expenditure on riding lessons and riding goods, such as clothing and equipment needed for practicing riding. Also, questions about the characteristics of the lessons and questions regarding education level, gross monthly income of the household, travel time and distance to the riding school, was asked.

Concerning horse-boarding activities, a survey consisting of 53 questions to yield information about the economic performance both in general and in relation to boarding, the pricing system of boarding, managerial and technical performance, customer details, as well as background information of both the business structure and the farm owner, was implemented in both Norway and Sweden. In the case of the latter country, the survey has been implemented through LRF without any connection or interference from the members of the research project.

Macro data were also used in this research project, mainly concerning activities of WP2 and WP3. In the former case, it turned out to be impossible to develop time series on the consumption of equine services in Norway and Sweden. However, explaining horse population in both countries is an important aspect of WP2 and for this reason the only way to "proxy" horse numbers has been to use the FAO data which oftentimes must be handled with special caution. The other macro data bases that were used consisted of employment data and national input/output tables for both countries aimed at constructing input/output tables at the national and regional levels with an explicit breakdown of equine activities. In this process, data derived from the micro-surveys were also used.

3 - Methods

Farmers are seeking to develop alternative business activities to supplement farm incomes following stagnating incomes in agriculture. In this context, developing horse-related activities such as horse boarding is suitable for farm owners who have grazing opportunities and a farm building structure in place. Boarding horse services imply that different sets of qualities and services are offered by farmers at a price that usually corresponds to the quality and service level provided. Analyzing the technical performance of farms involved in horse boarding is a major objective of this research project. To do so, two empirical studies were conducted. The first one estimated a stochastic production frontier of Swedish farms involved in horse-boarding activities. The adopted approach which is econometric-based specifies a Cobb-Douglas production function from which efficiency scores are first derived and then explained by a set of explanatory variables including socio-demographics of the farmers, subsidies they receive and location variables. The second empirical work dealing with horse-boarding farms aims at determining the factors influencing the prices charged by boarding horse farms in Norway and Sweden. For this purpose, an hedonic price model linking the (logarithm of the) price of horse boarding to a set of explanatory variables representing structural, locational, environmental and social characteristics of the farms is specified and estimated econometrically by ordinary least squares (OLS) and robust estimation procedures. The proposed model uses data collected with the sample survey of boarding horse farms ducted in Norway and Sweden.

As explained in the previous section, several micro surveys were conducted in Norway and Sweden on the various segments or actors of the Norwegian and Swedish equine industries. In these micro-surveys, several questions with an economic focus were asked but many of the respondents did not provide any answers to these questions and in case they did, the answers were not consistent and/or sufficiently reliable to be used in an empirical analysis. Given this state of affairs, it has been decided to conduct an empirical analysis on the performance of trotters/trainers in Sweden using a different set of data pertaining to 97 trotters/trainers. A non-parametric production frontier has been obtained for these trotter/trainer companies using a data envelopment approach (DEA). Technical efficiency scores which were obtained were regressed in a second step against a set of explanatory variables including regional dummies, manager's age, number of starts as trainers and money won per start.

An important component of this research project focuses on various forms of demand related to equine services and the factors motivating and influencing individuals (horse riders) to be involved in such recreational activities (WP2). Horse-related activities are wide ranging, including various facets such as recreational needs by consumers (equestrian trail-riding for instance) and other types of services (horse betting, breeding, etc.). Databases have been collected at the macro (national) and micro (individual) levels. Then econometric analysis of the demand for equine services is implemented by adopting a two-pronged approach. First, aggregate dynamic models linking the (per capita) number of horses (as measured by FAO) to relevant explanatory variables including macroeconomic variables such as real income (proxied by real per capita GNP), other economic macroeconomic control variables (unemployment rate, etc..) and the level of education are performed for a panel data of OECD and some emerging countries for the period 1980-2010. With this estimated econometric model, the elasticities between the per capita number of horses and the level of per capita real income have been estimated.

The second type of econometric demand studies on horse-related activities is to use micro levels based on household, riding-schools and farms with horse-related activities. In addition to the price study conducted on horse boarding (see section on WP1) a similar exercise has been conducted on the drivers behind the prices of riding lessons for adults and children in Sweden. With the complementary survey conducted with the clients of riding schools, an initial objective has been to develop a model aimed at estimating the demand for horse riding lessons by Swedish consumers. A travel cost model specification is developed and estimated with the survey responses on clients of riding schools. Employing this model the price and income elasticities of the demand for riding lessons offered by riding schools have been estimated.

An essential component of the demand for horse-related activities is associated with horse betting or gambling by households in Norway and Sweden. Unfortunately, it has been impossible to identify and use appropriate household survey data that provide relevant statistical information on the different categories of household gambling expenditures including lottery and horse betting and for this reason it has been impossible to develop demand model for horse gambling from which estimates of the income elasticities for this kind of gambling activity could be estimated. Despite this, an empirical exercise has been conducted by estimating the relationship between demand for Swedish gambling, income and the other socioeconomic variables using empirical models of participation and gambling expenditure. It also indirectly attempts to account for the effect of the recent recession on gambling behavior by comparing results when the economy was growing versus the period immediately after a major recession.

In WP3, economic and social impacts of potential growth or structural change in the equine industry are assessed through an understanding the interactions with both suppliers and consumers of intermediate and final products. An input-output (IO) model is a tool for analysing such linkages and impacts (Leontief, 1966)⁵; but for the horse sector such information is currently both missing in national IO accounts – as well as distributed in different sectors of the economy. For instance, agriculture is usually aggregated into a single sector in national accounts – whereas riding schools are part of recreational activities. The IO model is a frequent tool to analyse the economic importance of different sectors and for analysing the impacts of actual or proposed changes in final demand. Here it is used to analyse the horse sector both from a national and regional perspective. IO coefficients are basically average values describing the quantities of inputs used in production of a commodity or industry. We have collected such values using surveys, databases as well as interviews; as described further below. IO coefficients are used to derive multipliers showing the direct, indirect and induced impact that each sector has on the economy if it is experiencing a positive or negative shock. In this work, two types of multipliers are computed. The first type is called an open multiplier and assumes that household demand is exogenous. The second type is the closed multiplier which will generate the impact of a change in final demand on the output of a sector output assuming that household expenditures and revenues are endogenous. In so doing, the resulting closed multipliers will be larger in size than their open counterparts. We also examine the regional structure of such multipliers. National tables are usually regionalised using employment data. As such data do not actually exist we use the regional horse numbers to regionalise our structural data to the level of counties in both Norway and Sweden. Due to lack of sufficient data information, we have been able to generate regional multipliers for only one region (Boskerud) in Norway while for Sweden regional multipliers have been obtained for 21 regions.

Implementation of WP4 was undertaken by adopting a foresight methodology similar in spirit and scope conducted in France in 2011 and 2012 on the future of the equine industry in that country⁶. Foresight is an attempt to identify trends and developments in a country, economy or industry sector. It is viewed as an exploratory approach in order to facilitate the interpretation in terms of current actions upon possible future states. The main objective is to inform decision makers about possible and likely outcomes of prevailing and anticipated future trends. The idea is not to scientifically determine future outcomes but to provide a vision of where the current states are headed in the future. Using the macro-econometric model developed in WP3, we conducted an analysis where the horse number per capita was regressed against the per capita gross domestic product (GDP), education level and a time trend variable. We then constructed two scenarios, a base scenario with the “normal” growth in population and GDP and one with an economic crisis, exemplified by the “Lehman Brothers” period 2008-2012, and used the estimated results to project future development of the horse numbers. The idea is not to scientifically determine future outcomes but to provide a vision of where the current states are headed in the future. As explained by Jez (2013 p. 52)⁷, “it seeks to raise the awareness of possible upcoming trends among economics and institutional stakeholders, and therefore to help them prepare for change. In this sense foresight can be a relevant decision-making tool for designing research orientations and industry strategies.”.

⁵ Leontief, W. (1966). *Input-Output Economics*. New York:Oxford University Press.

⁶ The analysis and findings of these scenarios on the future of the French equine industry is presented in a special issue of *Advances in BioSciences*. (Vol 4) published in 2013.

⁷ Jez, C. (2013). The foresight approach. *Advances in BioSciences*. Vol 4(2),pp. 52-53.

4- Results

In this section are reported the essential results/findings of this research project. They are presented on a work package basis.

4.1 - WP1 – Critical factors for successful development of horse activities at farm level

The DEA results on limited/incorporated trotter/trainer firms in Sweden reveal that average technical efficiency is quite low, being equal to 0.35. This result which must be compared to a technical efficiency score of one is quite surprising at first glance. However, it might not be so because it is just a reflection of the fact that there is a large heterogeneity among the firms under study. When these efficiency scores are regressed against a certain number of explanatory variables, it is found that they are a significant and decreasing function of manager age. This suggests that younger trainers/trotters are on average more successful. It may be assumed that there is an optimal size of the trotting firms and this was captured by including in the regression the number of starts as a measure of firm's size. This latter variable was included into the model as a quadratic function. Econometric results show a significant nonlinear relationship between efficiency scores and the number of starts. As expected, this nonlinear relationship has an inverted U-shape. The regional dummies are not all statistically significant. Surprisingly money won per start has a negative coefficient but is statistically insignificant. This may indicate that this explanatory variable is not a good measure of managerial skills. Despite the fact that the econometric results explaining the technical efficiency scores of Swedish trotters, some caution must be exerted on their interpretation in light of the low values of the efficiency scores. Turning now to the stochastic frontier analysis of farms involved in horse boarding, it is interesting to find an average technical efficiency of about 0.7. This indicator ranges from 0.51 to 0.83. When the efficiency scores are regressed against a set of explanatory variables, none of them are statistically significant. These latter results must be interpreted with caution and may question their reliability due to the fact the sample of farms that has been used is small (59 observations) but also due to the quality of these data concerning the measurement of some input such as capital and labor.

From the Norwegian and Swedish surveys on farms activities dealing with equine services, 330 responses were obtained on the price of horse boarding. A regression model based on 14 explanatory variables was selected using 205 observations. The explanatory power of the model was satisfactory (adjusted R^2 of 0.64). Nine explanatory variables out of fourteen are statistically significant at a 10% level. Sweden dummy variable and the variable defining nearest horse boarding facilities are significant and could have either a positive or negative effect on the price of horse boarding. For instance, an increase by one km in the distance away of from the closest town results in a 0.5% reduction in the price of horse boarding. Horse boarding capacity, the share of grazing land, agricultural activity on the farm and receiving subsidies, albeit having in most cases the expected effects on the price of horse boarding, are not statistically significant.

4.2 – WP2: Analyzing demand for horse-related recreation activities and equine services

Preliminary investigation of observations on horse number per capita for the period 1980-2010 clearly shows that for many countries under study they follow in most cases a U-shaped form with a declining trend until the nineties. Given this, the empirical macro-econometric models are specified in such a way the log of per capita horse number is regressed against a quadratic function of the per capita real gross domestic product (GDP), education level and a time trend variable. The econometric estimation of these models was conducted individually for each country. Overall, most of the estimated models provide a reasonable goodness for fit with R^2 higher than 0.7. For many countries under investigation including Norway and France, the estimates of elasticities with respect to real (per capita) GDP obtained for 2010 are in most cases in the [0.7 - 1.0] range.

Turning now to empirical demand work based on micro data, the double hurdle model explaining household gambling expenditures in Sweden has been estimated using 2003 and 2009 Swedish household data. The empirical results are reported in a scientific paper (see Table 2). The pattern on income elasticities across income classes show that estimates of the income elasticities of the demand for gambling by Swedish households generally are below one. This finding is quite robust and do not vary widely among different classes of households ranked by income levels. This latter empirical finding implies that implicit Swedish gaming taxes are regressive. Income elasticities became smaller after the recession.

Using the country-wide survey of riding schools in Sweden, an analysis of the market for riding lessons is undertaken with the additional objective of determining how various subsidies interfere with this market. It is found that profitable riding schools mainly exist in peri-urban areas and depend heavily on the willingness of customers to commute. A positive relationship between average household income in the nearby town/city and the price of a riding lesson is also identified. However, most riding schools in the sample received financial support from national and European sources. The econometric results are presented in a paper submitted to the *Journal of Outdoor Recreation and Tourism*. The preliminary estimation of the travel cost model to explain the demand for horse riding lessons in Sweden did not lead to meaningful and reliable econometric results from which realistic and interpretable income and price elasticities of the demand for riding lessons could be obtained.

3.3 -WP3: Economic impacts of equine sectors at national and regional levels

Selected results presented in Table 1 indicate that the highest multipliers for equine activities are to be found for riding schools and breeders⁸. The reason for such high multipliers can be that these enterprises (often in the form of a voluntary and hobby activity) are not making any profits and all revenue is used for purchasing inputs to the activities and hence spent in the supply chains. Activities needing to allocate some revenue to return to capital and wages show somewhat lower multipliers; e.g. boarding enterprises and professional trainers. For the national Swedish IO model we find multipliers for the horse sectors ranging between 1.47 and 2.15 for the open model, and 2.61 and 3.19 for the closed model. If we compare these to some other multipliers for the agricultural sector we see that they are in line with these values. The results for Norway are rather similar to those for Sweden, with the exception being that the multiplier for trainers are higher in Norway. In Norway we were also able to model the horse tourism sector and this sector displays open multipliers in line with e.g. riding schools and boarding enterprises, but closed multipliers which are lower than riding schools (indicating less labour intensive activities) but higher than boarders (being more intensive than the latter).

Concerning regional results it is evident that multipliers are high in such regions where the surrounding economy can support horse-related enterprises and activities and provide for feed, equipment, transport services, etc. Even if the number of horses per capita is impressive on the island of Gotland the multiplier impact of horses on the surrounding economy is rather weak. The interpretation being that as the region is rather small, and also characterised by being an island, there is a large amount of imports for other Swedish regions (or from abroad) of inputs to the horse sector. However, this is true for e.g. agricultural activities, which also show low regional multipliers. In comparison the large and dense regions of Stockholm, Skåne and Västra Götaland

⁸ As already mentioned, two categories of output multipliers are calculated in this project. The first one, called open multiplier, determines the impact on each sector output of an exogenous change in final demand. In this case, household expenditures and wage payments by the productive sectors are assumed to be exogenous. The second kind of output multiplier is called "closed" and assumes that household expenditures and wage payments are endogenous. When comparing these two categories of output multipliers, the closed one is greater in magnitude than its open counterpart.

display higher multipliers, indicating that horse activities are integrated into the local economies (as are many sectors of such regional economies). Värmland is included to show the magnitude of multipliers in a somewhat remoter region but with larger urban centres and more regional production of feed and horse related products. The idea is that this region is similar to the Buskerud region in Norway. We see that for this latter region the multipliers are rather similar to Värmland. Riding schools and trainers display high multipliers, whereas boarding seems to be a rather low-intensive activity.

Table 1: Some selected multipliers for equine activities in Norway and Sweden

Equine sectors	National multipliers		Regional multipliers ^a				
	Open	Closed	Open				
<i>Norway</i>			Buskerud				
Boarding	1.46	2.28	1.06				
Breeders	1.91	2.96	1.11				
Horse tourism	1.74	2.65	1.10				
Riding schools	1.76	3.51	1.22				
Trainers	2.04	3.22	1.19				
<i>Sweden</i>			Gotland	Skåne	Stockholm	Värmland	V. Götaland
Boarding	1.47	2.86	1.02	1.16	1.22	1.10	1.23
Breeders	2.00	2.90	1.04	1.36	1.50	1.19	1.48
Riding schools	2.15	3.19	1.06	1.40	1.54	1.23	1.56
Trainers	1.74	2.61	1.03	1.28	1.37	1.14	1.37

Notes: V. Götaland = Västra Götaland

a) Closed regional multipliers are not reported for Norway but are with in the same range as those obtained for Sweden.

3.4 - WP4: The future of the horse industry in society – synthesis

The original objective of this work package was to undertake an investigation of the future prospects for the industry from business, consumer and societal perspectives. In this perspective, we were concerned with the future developments of the horse industry in Norway and Sweden. The horse industry is characterized by some unique features in the sense that it is offering a multitude of recreational services for the individuals and at the same time it consumes resources such as arable land. A literature review indicated that developments in the horse industry are affected by a complex set of factors that are not very likely to remain constant over time. Previous scenario analyses conducted for Sweden as well as for France indicated that developments in the macroeconomic environment are crucial for development of the horse sector. Both analyses revealed that the horse industry may be quite vulnerable to an economic down-turn and a changing complexity of the interactions between urban and rural areas. The projections made with the macro econometric models developed in WP3 reveal that the Norwegian horse industry is quite resilient to economic shocks of the magnitude experienced during the aftermath of the Lehman Brothers crisis. The Swedish horse industry does not reveal equally resilient features. Forecasts considering the presence of a statistically significant negative time trend imply a decline of about 5.3% per year, everything else equal. However, there are serious questions regarding to what extent this estimate is affected by data problems that are much more severe compared to France and Norway.

As the present and expected population growth is stronger in urban than rural areas, and also income per capital tends to grow strongest in and close to be biggest cities, the horse sector also could be expected to have higher growth in urban and peri-urban areas compared to rural areas. This might be strengthened by a tendency towards an aging rural population while the urban areas have relative more young people. On the other hand, competition for available land might be strongest in urban areas. The cost of stabling horses and for disposing of manure might also be considerably higher in urban areas. Another question that may be extremely important is how well the horse industries in Norway and Sweden will be able to compete in the future in terms of financial resources as well as for available leisure time among its prospective proponents/consumers. The latter issue lends itself well for future research using a multitude of scientific approaches.

5– Dissemination activities

In this section are reported all the various actions that have been implemented to disseminate the findings of this project. This took place in various forms including presentations to conferences, submissions of papers to scientific journals, meetings of the reference group and a popular article published in the Swedish magazine. *Ridsport*. A full account of these dissemination activities is presented in Table 2. Some initiatives have occurred at the European level in 2012 and 2013 to promote the dissemination of equine research projects that have an economic and social science focus. This was mainly done in the context of the European Association of Animal Production (EAAP) and led to the organization of a special session called “*The New Equine Economy in the 21st Century*” that was held in at the Annual EAAP Conference in Nantes, August 25-29, 2013. Empirical works conducted in this research project were presented in the form of an invited presentation and a poster (see table 2 below for more details). A follow up of this special session is going to lead to a book published by Wageningen University Press (WUP). In 2013, two persons participating in the project (H. Andersson and Y. Surry) become members of the Equine Research Network and the group on socio-economic research of the Horse Commission of EAAP.

It should be pointed out that the major part of these dissemination activities which have taken place so far occurred in the last eighteen months of the project life. Contacts were made with the equine industry through meetings of the reference group. See below for an account of these dissemination activities. Further dissemination activities of this research project are planned later in 2014 and 2015. These activities will consist of finalizing scientific papers on empirical works conducted under WP1 and WP4 but also of writing some extension-oriented articles for Norwegian and Swedish equine-related magazines. For these latter articles, emphasis will be put on surveys conducted in Norway and Sweden on the various segments of the equine industry.

Reference group meeting

As part of the project the results were presented at a meeting with the reference group (Gøran Dahlin, SLU, Grete Stokstad, Skog og Landskap and Hans Ellef Wettre, Norges Bondelag). The meeting took place on October 2 2013 at the Norwegian Agricultural Economics Research Institute in Oslo (NILF). At the meeting an overview of the project and detailed reviews of the four work packages (WP) were presented by Anna Milford/Yves Surry (WP1), Hans

Anderson/Yves Surry (WP2), Arild Spissøy/Yves Surry (WP3) and Agnar Hegrenes/Hans Anderson (WP4). The meeting ended with a discussion of the results and suggestions for the scenario analysis by the reference group. A meeting with the reference group was also conducted at SLU at the start of the project in which also Anna Hedberg and Magnus Nordgren participated from Sweden.

Table 2: List of dissemination activities conducted during the life of the project

Conferences

1) 64th annual EAAP Conference , Nantes, France, August 25-29, 2013, Session 18: The new equine economy: Growth in new sectors and activities in the 21st century.

Invited Presentation: Lindberg G., Spissoy, A. and Surry, Y.: Assessing economic impact of equine activities in Norway and Sweden using input-output modelling.

Poster presentation: Surry Y., Milford A. B. and Andersson H. Determinants of price of horse boarding. A study of Sweden and Norway

2) 40^{ème} Journée de la Recherche Équine, Paris, France. March 18, 2004

Presentation: Surry, Y., Asheim, L. J., Hegrenes A. and Gregg, D. Est-il possible d'expliquer et de prédire la population des équidés dans les pays de l'OCDE et émergents? (Is it possible to explain and predict horse population in OECD and emerging countries ?)

3) 3rd Nordic Rural Research Conference: Nordic Ruralities: Thriving and Declining Communities, Trondheim, Norway, May 12-14, 2014. (Postponed to September 2014).

Presentation: Andersson, H, Hegrenes, A, Asheim, L.-J and Surry, Y. Scandinavian horse industries – Future scenarios-

Reference group meetings

1) Meeting held at the start of the project, 2010.

2) Meeting held in Oslo on October 2, 2013

Papers and book chapters

1) Rude, J. and Surry Y. (2012) A generalized double hurdle model of Swedish gambling expenditures. Under review with *Applied Economics*.

2) Hess, S. Surry, Y., Kron, R., Liljenstolpe, C., Lindberg , G. and Andersson, H. (2012). Analysing the market for riding lessons: Empirical evidence from Sweden Under review with *The Journal of Outdoor Recreation and Tourism*.

3) Lindberg, G., Spissoy, A. and Surry, Y. (2014). Input-Output Analysis of Swedish and Norwegian Horse Sectors: Modelling Socio-Economic Impacts of Equine Activities. Book chapter to appear in Vial, C. and Evans, G. (eds.) *The New Equine Economy in the 21st Century*- WUP.

4) Surry, Y., Milford, A- B- and Andersson, H.- (2014). What are the factors influencing the price of horse boarding? An empirical investigation based on Norwegian and Swedish farms. Book chapter to appear in the book edited by Vial, C. and Evans, G. et published by WUP.

Other dissemination activities: Unpublished works and extension materials

1) Larsen, K, Andersson, H., Surry, Y. and Kron R. (2012). Technical efficiency of Swedish trotting firms. Unpublished paper

2) Andersson, P. (2014). Analyzing technical efficiency of Swedish farms involved in horse boarding activities. A stochastic production frontier approach. Msc thesis not yet submitted.

3) Extension article published in *Ridsport*, September 2012
