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Swedish University of Agricultural Sciences

Department of Economics

A cost benefit analysis of public procurement of pork meat

- Imported, Swedish or locally produced?

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Abstract

Public procurement stands for a substantial part of the total food consumption in Sweden. The majority of the procured food is today imported and according to market trends it's intended to stay that way. Imported food is favoured for locally produced due to price pressure. Consequently domestic pork farmers have declined by 25 percent during the last twenty years. This issue has unquestionably stimulated a public opinion of an increase in locally produced food. The main purpose of this paper is to find if there are socioeconomic incentives for public kitchens to purchase only locally produced pork. A cost benefit analysis will be used to monetize relevant costs and benefits. The result shows significant large economic incentives for public procurement to consist of locally produced pork. The results are however sensitive to several assumptions and should therefore be interpret with caution.

Sammanfattning

Offentlig upphandling står för en betydande del av den totala livsmedelskonsumtionen i Sverige. Merparten av den upphandlade maten importeras och enligt marknadstrender är det avsett att förbli så. Den utländska importen av fläskkött föredras över svenskproducerat framförallt på grund av stark prispress. Följaktligen har andelen grisbönder i Sverige minskat med 25 procent under de senaste tjugo åren. Detta har utan tvekan stimulerat en opinion för ökad lokalproducerad mat i de kommunala köken. Syftet med denna uppsats är att undersöka om det finns ekonomiska incitament för offentliga kök att handla endast lokalproducerat fläskkött. Som analysmetod används en kostnadsnyttoanalys för att värdesätta nyttor i monetära mått och se om dessa överstiger kostnaderna. Resultatet visar ett starkt ekonomiskt incitament för offentlig upphandling att bestå av lokalproducerat fläskkött. Resultaten är dock känsliga för flera antaganden av den reella prissättningen och bör därför tolkas med viss försiktighet.

Abbreviations

CBA	Cost-Benefit Analysis
CVM	Contingent Valuation Method
NSB	Net Social Benefit
SEK	Swedish Kronor
WTP	Willingness To Pay

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1. Introduction

In 2013 the market for publicly procured food in Sweden reached a value of 8,9 billion SEK and 4.4 billion of that had Swedish origin (Ryegård, 2013, p.2). A continuous trend is that the share of imported goods is gaining momentum as a part of the food markets globalization. The consequences of increasing imports, in particular for pig meat, are widely debated in Sweden. According to the chairman of the organisation Pig business in Sweden will the increasing import rate soon enough outcompete most of the domestic pig production. The public debate is mainly focusing on domestic farmers loss of business and imported meats effect on both human and Swedish animals health.

Loss of jobs for farmers is not only devastated to the farmer himself but it's also in direct conflict to rural development. The farmer has a central role on the countryside since he keeps the landscape opened. Without an opened landscape the area is not attractive for neither living nor visiting. Farmers also benefit the infrastructure in the rural area since they create other jobs for veterinarians, feed sellers, equipment dealers and others (Bentzel, 2013).

The health related problems to humans consist of the increasing antibiotic resistance and the MRSA-bacteria. In Sweden a growing number of people are becoming resistant to antibiotics. A major reason for that is because we eat more and more imported meat, which contains high levels of antibiotic-resistant. The Swedish pig farmers on the other hand use very little antibiotic compared to other European pig farmers (Gustawson, 2014). A generous usage of antibiotics creates resistant bacteria's. One of them found in 88 percent of the conventional produced pigs in Denmark is the MRSA-bacteria (Khilberg, 2014). Four people in Denmark that carried the MRSA-bacteria died of blood poisoning since the antibiotics do not bet on the resistant bacteria. It has gone so far that a member of the Swedish parliament, Hans Hoff, requires an import ban on Danish pork meat. As for the animal's health, critics means that increasing imports contribute to spread of diseases. The Swedish animal welfare, which has kept Swedish pigs healthy and free of salmonella and other infections, might then be threatened (Ennart, 2014).

Continuously it also becomes harder to follow the country of origin for pork since the information on origin is not legally regulated within the EU framework for pork meat (SMECO, 2014). In Sweden it further becomes more difficult mainly because of two reasons, one: many former Swedish food companies are today multinational, two: private labels with its anonymous origin continue to grow.

Most of the procurement contracts are currently given to large national companies while local entrepreneurs find it difficult to be a part of the procurement process. The perceived barriers to participation include; not enough information about municipal contracts; it's complicated to fill out all the forms; the requirements for low prices; and the qualification criteria's of most procurement contracts requires the producer to deliver many different products. Small local producers often don't possess the capacity to even request to participate.

Especially Swedish pork producers are disappointed with how the public sector manages the procurement since they face mayor problems with profitability (Laszlo, 2014). The problems with profitability are partly due to the large price difference between Swedish and imported pork meat and that many consumers are sensitive to prices (Jordbruksverket, 2008). If facing large price difference between Swedish and imported pork, most consumers will choose to purchase the less expensive alternative. The price difference is largest for meat sold unprocessed in shop, with a price difference assumed to be SEK 15/ kg pork. The higher price of Swedish pork relative to other EU countries is due to higher labour costs and stricter standards for animal welfare (LRF, 2013).

Apart from the price issue, many municipalities find it difficult to involve local producers without breaking EU directives and Swedish laws on public procurement. In 2010 the Swedish government decided that 25 percent of the publicly procured food must be ecologically certified (Swedish Government Paper, 2005/06:88), where as the issue of locally produced has no official support by the government. Even if Swedish municipalities show an interest in purchasing locally produced food (Granvik, 2012) the issue of legal regulation put a spanner in the works.

Despite the trend of increasing imports, the level of interest in purchasing locally produced food has increased among consumers and traders during the last couple of years (Coop, 2009). The most common preferences for choosing local food are usually related to environmental aspects, animal welfare, food security, preservation of open landscapes, supporting the local community and the belief that local food is healthier and fresher than conventional food (DeLind, 2006). According to a survey on consumption conducted by the consumer-owned Swedish cooperation Coop (Coop, 2009) most consumers finds it important to choose locally produced products. Of the consumers purchasing locally produced 85 percent do it because they want to contribute to a better climate and 79 percent purchase local food to support local producers. Even if the interest in purchasing locally produced is assessed to be high, in reality most consumers will choose the imported alternative. The market responds to consumer demand and as long as consumers demand imported pork meat, imports will continue to grow.

Purpose and data

The purpose of this study is to find if there are economic incentives for municipalities to procure only locally produced pork. A cost benefit analysis will be used in order to calculate the social net gain for such a scenario. The social net gain will then be compared to the social net gain of the keeping distribution of origin of procured pig meat as it is today. Calculations will be based on data from the Central purchasing body in Mora. The data set includes only purchases done through the municipality's largest wholesaler Menigo. Although it's unknown exactly how large share of the total food purchases Menigo possess, it's assumed to provide an adequate basis to answer the research question.

Limitations

In order to limit the scope a geographical area in northern Dalarna will be used for this study. In this area seven municipalities including Leksand, Mora, Rättvik, Älvdalen, Orsa, Vansbro and Malung/Sälen have a cooperative public procurement. The reason why these municipalities chose to have cooperated procurement is because it's difficult for a small municipality to handle the complicated process by its own. These municipalities are of interest since they've been active for many years in the debate regarding public procurement of food and how to involve more local producers.

Previous studies and disposition

The research area of public procurement has during the last couple of years caught a lot of attention. One mayor focus on an international level is the issue of having sustainable procurement. What most of them, Walker (2009) for example, have in common is that cost is found to be the leading barrier to sustainable procurement.

In Sweden, Jonasson and Andersson (1997) studied how the strict animal protection legislation in Sweden affects the economy in pig production. The estimates compared production results from the most skilled producers in Sweden with the most skilled in Denmark. The results showed that the Swedish model costs about 1,13 SEK more per kilo pork. Differences in taxes, levies, aid and prices of inputs were not taken into account. In the

discussion the author's states that the cost disadvantage derived to the Swedish model might be expected to decrease as tougher welfare standards comes into force in other EU countries. The cost of adapting is higher to existing building systems compare with the transition to new fully customized systems. Since Swedish producers already adapted to a strict animal welfare system and producers in EU have not, the Swedish model could provide future benefits. What is also interesting about this study is that the importance of good animal health was illustrated by comparing numbers of pigs free of infections. The growth rate was 10 percent better for Swedish pigs, giving an approximately value of 1,5 SEK per kilo pork in reduced costs. Therefore might the unutilised potential of a good animal health be significant.

The Federation of Swedish Farmers (LRF) has put a lot of resources into public procurement in Sweden throughout the last years. Their focus has been on both a national level exploring current trends on the public food market in Sweden, and on a local level in order to find new models to integrate local producers into the procurement process.

The governmental procurement committee in Sweden however find current research in the area to be limited, partly because of the substandard procurement statistics. The committee assess the scope for improvements and efficiency in public procurement to be very high and therefore urge a broaden research to deepen the analysis (Upphandlingsutredningen, 2010, p.23).

The outline of the paper is as follows. First, a short background which briefly describes the public procurement process, the pig market trends in Sweden and the origins of pork meat currently purchased by the municipalities. Second, the cost benefit analysis (CBA) method is presented and discussed. Third, the costs and benefits from the alternative scenario are derived. Fourth, the results from the analysis are presented and social net gain from each scenario is estimated. Finally a discussion concludes the paper.

2. Public procurement

In Sweden public procurement is regulated by the Swedish Public Procurement Act (2007:1091- LOU), which is mainly based on the EU Directive 2004/18/EC concerning public procurement (Swedish Competition Authority, 2012, p.3). When following the Swedish procurement rules, municipalities or other contracting authorities meet the obligations of the EU law. As a member of the EU there are principles of the Community law that must be followed through all public procurement. These principles include non-discrimination, equal treatment, proportionality, mutual recognition and transparency.

A municipality shall under the rules be factual and choose a supplier with respect only to what is being purchased. Other consideration, as loyalty to their country suppliers, local suppliers or former providers is not permitted. The choice of the supplier shall be made on a commercial basis and based on which provider offers the best quality goods at best terms (Swedish competition authority, 2014).

Due to these strict regulations municipalities often find it difficult to formulate a legal contracting document if they want to purchase locally produced products. However, in the notice and contracting documents municipalities are authorized to include requirements of sustainable development, such as social and environmental considerations (Swedish Competition Authority, 2012, p.12). In this part of the contract there are opportunities for municipalities to require that food are produced according to certain criteria's and then formulate a contract that can be fulfilled by local producers as well as for larger suppliers (SEMCO, 2014).

Even if a contract is formulated in a way that local producers could participate, many of them will in the end not be a part of the tender process. The only way a municipality

can support local producers to participate in public procurement is to provide education on public procurement, by emphasizing the municipality's need for goods and services. (Malung-Sälens Kommun, 2014).

3. Pork production

After joining the EU in 1995, domestic pork production in Sweden has declined by 25 percent (Swedish meat A, 2014). Journalist Lagerwall (2014) states that the Minister of Rural Affairs Eskil Erlandsson sent a letter, on the 18th of February 2014, to several Swedish municipalities urging them to purchase Swedish meat. He means that the public sector is a major cause of pig producers failing profitability since the majority of procured pork is imported. Erlandsson find this trend particularly serious because jobs are disappearing and imports are increasing. Below is a figure illustrated by Swedish meat (2014) showing the declining rate of domestically produced pork meat and increasing import rate.

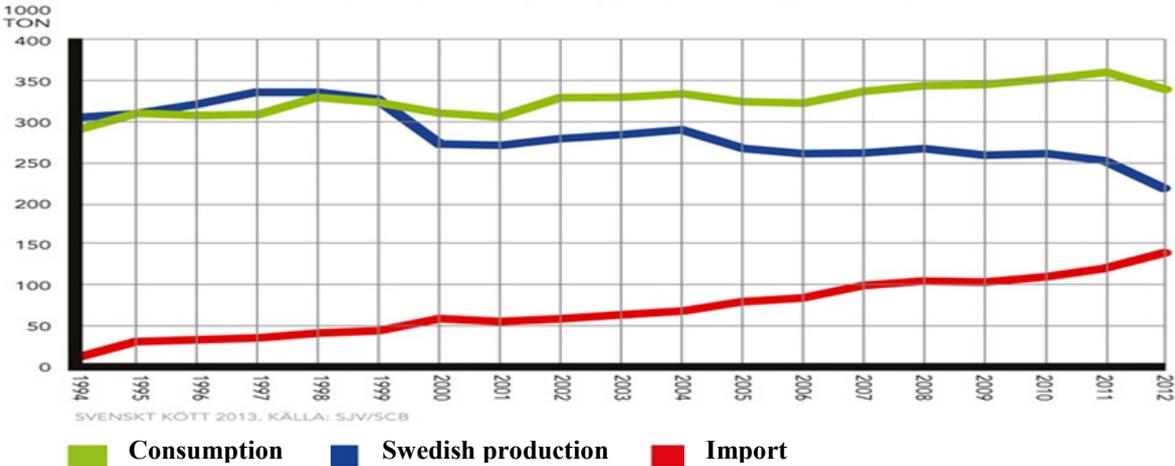


Figure 1. The pork markets development in Sweden, counted in 1000 TON. Source: SJV/SCB (2014)

4. Procured pork meat

Pork meat stands for a substantial part of the meat publicly procured. In the cooperative procurement in northern Dalarna involving seven municipalities the distribution of procured meats is illustrated in the figure below.

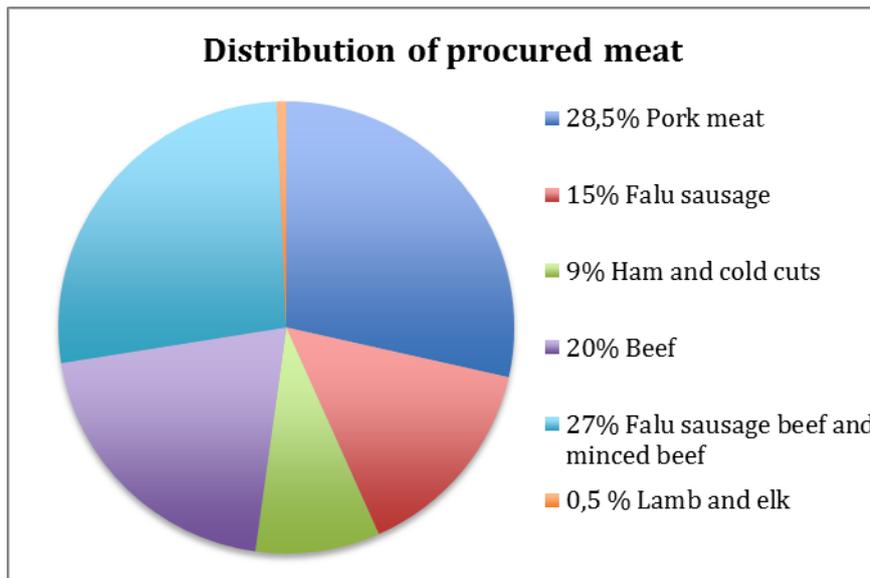


Figure 2. Distribution of procured meat in the municipalities of this study.

Source: Own calculations based on data from the central purchasing body in Mora.

Note: Mainly cured meat pieces are included in the model. Only a few processed meat products are included depending on the share of additives. *Falu sausage* is a classic type of sausage used in the Swedish kitchen and contains mostly pork and therefore is included in the study as pork meat. *Falu sausage beef* on the other hand contains more beef and will therefore be included in the segment beef meat. Both types of *Falu sausage* are included since it stands for a substantial part of the distribution and must contain no less than 45% of meat according to EU-rules (Swedish meat B, 2014). Further no pre-cooked meals containing meat are included in the model.

Looking at figure 2, pork stands for 52,5 percent of the total amount of procured meat in the municipalities of this study. The variables included as pork meat are: *pork meat*, *falusausage* and *ham and cold cuts*.

In figure 3 bellow, the distribution of origin of the pork meat in the municipalities of northern Dalarna is illustrated. In 2013 had about 50 percent of the procured pork Swedish origin and 3 percent of that was locally produced. The rest of the pork meat share in northern Dalarna came from imports mainly from the EU.

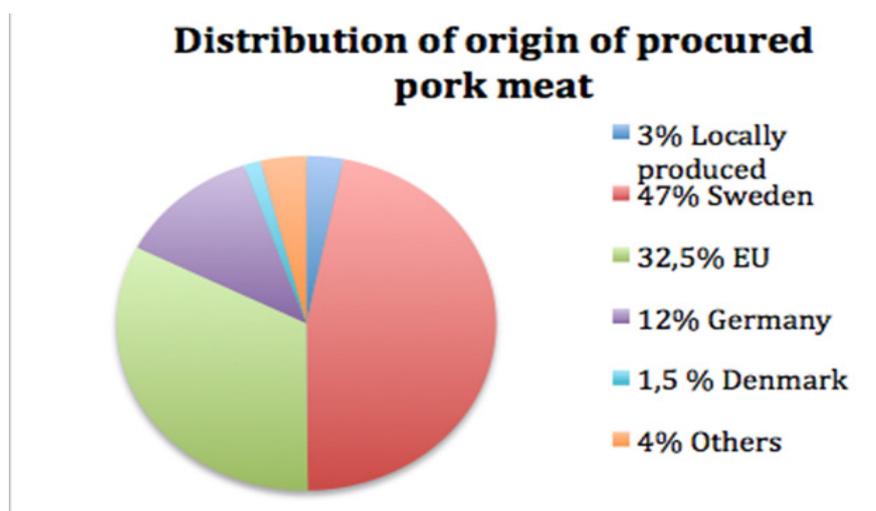


Figure 3. Distribution of origin of procured pork meat in the municipalities of this study.

Source: Own calculations based on data from the central purchasing body in Mora.

5. Cost-benefit analysis

The process of a cost-benefit analysis consists of identifying, measuring and comparing the social costs and benefits of an investment program or project (Brown & Campbell, 2003). The project in question may be public, undertaken by the public sector, or private projects. Both publicly and private projects need to be assessed to adjudge whether they represent an efficient use of resources. Cost benefit analysis (CBA) is used to evaluate projects from a social viewpoint. The aim of the CBA is then to provide information to the decision makers, the official who will evaluate the project, as a basis for a rational decision on how to effectively allocate society's resources. A CBA should however provide an objective appraisal and the analyst should not adopt a supporting position for or against the project.

In an investment project the aim of the CBA is to measure the differences in society between undertake the project and not undertaking the project. The value of a project is measured by its net social benefit (NSB); the projects social benefits (B) minus social costs (C). The value of each alternative NSB is then compared in order to find the most societal beneficial alternative.

$$\text{NSB} = \text{B} - \text{C}$$

There are two mayor types of cost-benefit analysis, *ex ante* CBA and *ex post* CBA. *Ex ante* is carried out when a project is considered and under process. It gives the decision makers an opportunity to see what the possible cost and benefits might be and whether resources should be allocated to the project or not. *Ex post* is on the other hand carried out by the end of a project. The reason is to find if the project was worthwhile and conclusions can be useful for future decisions.

In order to make the process of constructing a CBA more convenient Boardman, et al. (2010, p. 7-15) broke it down to nine basic steps listed in the table below.

Table 1 Own illustrations based on Boardman, et al., 2010

The basic steps
1. Specify the set of alternative projects.
2. Decide whose benefits and costs count (standing).
3. Identify the impacts categories, catalogue them, and select measurement indicators.
4. Predict the impacts quantitatively over the life of the project.
5. Monetize (attach SEK values to) all impacts.
6. Discount benefits and costs to obtain present values.
7. Compute the net present value of each alternative.
8. Perform sensitivity analysis.
9. Make recommendation.

The first step requires the analyst to specify the set of alternative projects, usually not more than six. CBA will compare the social net benefit of investing resources into a possible project with the net social benefit of the current project in process. The current project is often called the counterfactual and is the status quo, meaning no change in government policy. In this study two alternative projects will be carried out. The first is the status quo-alternative, meaning no change in the origin of pork meat publicly procured. The other alternative will be public procurement of pork meat to exclusively consist of locally produced pigs.

Step number two is to decide whose benefits and costs that should be included. It could be done from the national, provincial, global or local prospective. Due to the limitations of this study the provincial prospective will be analysed, keeping in mind that some ignored cost and benefits will borne by higher level of governments.

Number three identifies the impact categories of the alternatives, catalogue them as costs or benefits and select measurement indicators. Analysts are interested in the projects impacts on individuals' utility; impacts with no influence on humans are not relevant. Even if the purported impacts are often stated in very general terms, the analyst must be able to state the impact with a cause-and-effect relationship between the outcome of the project and the utility of individuals. When choosing the measurement indicators, it's relevant to see what data is available and the possibility of putting a monetary value on it.

The fourth step is to predict the impacts quantitatively over the life of the project, i.e. quantify all impacts in each time period. The process of prediction impacts is very import and difficult. It's especially difficult when the projects are unique, have a long lifetime or if the relationship between impacts are complex.

In the fifth step the analyst monetize each impact in a value of SEK. Often the most important impacts are difficult to value in monetary terms. In a cost-benefit analysis the value of an output is often measured in "willingness to pay" (WTP), if no person is willing to pay for some impact the value should be zero in the CBA.

Step number six is to discount benefits and costs to obtain present values. If a project occurs over several years the analyst need to aggregate the benefits and costs that take place at different times. In the CBA future costs and benefits are discounted to obtain a present value (*PV*). Discounting is important for two reasons; first there's an opportunity cost to the resources in a project and second is that consumption today is preferred to consumption tomorrow. Even if inflation has nothing to do with discounting it must be taken into account. When a cost or benefit occur in time *t* it's converted into present value by dividing it by $(1+r)^t$, where *r* represent the social discount rate. If a project has a lifetime of *n* years, and benefits and costs for time *t* are denoted B_t and C_t respectively, the present value of the benefits $PV(B)$ and costs $PV(C)$ are

$$PV(B) = \sum_{t=0}^n \frac{B_t}{(1+r)^t}$$

$$PV(C) = \sum_{t=0}^n \frac{C_t}{(1+r)^t}$$

The choice of an appropriate social discount rate is arguable and therefore a good candidate for a sensitivity analysis. Broadman, et al. (2010, p.12) recommends a social discount rate of 3.5 percent for projects less than a lifetime of 50 years. In the matter of this study, no discount rate will be used. The reason for that is because it's assumed costs and benefits of the alternative scenario will not take place at different times.

After discounting the analyst should compute the net present value (*NPV*) of each alternative. *NPV* of each alternative equals the difference between $PV(B)$ and $PV(C)$.

$$NPV = PV(B) - PV(C)$$

The decision for a single alternative relative to the status quo is simply to go though with the project if its *NPV* is positive. An analyst should recommend preceding the proposed project if its benefits exceed its costs:

$$PV(B) > PV(C)$$

If there is more than one alternative to the status quo, the selection process should be according to the project with the highest *NPV*.

The 8th step is to perform a sensitivity analysis since there may be considerable uncertainties about predicted impacts and monetary valuation of each unit of the impacts. The analyst might be uncertain about predicted quantity of measurement or appropriate value of each unit. There could also be some doubts regarding the proper value of the social discount rate. Sensitivity analysis tries to deal with these uncertainties.

The final step is to make a recommendation and most likely it would be to adopt the project with highest *NPV*. It's important to emphasise that CBA propose recommendation on how resources should be allocated, it's not a descriptive theory on how resource allocation should actually be done.

5.1 Limitations of CBA

When using the cost-benefit analysis it's important for the analyst to be aware of the limitations with the method (Boardman, et al., 2010, p.49). The net benefit criterion might be an unsuitable decision rule for policy makers. Specifically when considering technical limitations and goals other than efficiency.

The pareto principle can only be set through estimating net social benefits and that obligates costs and benefits to be put in monetary values. If there are technical limitations in data, theory or analytical resources it's impossible for the analyst to find a monetary value to all impacts of a policy's costs and benefits. In a situation where it's impossible to monetize the impacts, a *qualitative cost-benefit analysis* could be an alternative or if only a few of the important impacts can be monetized a *cost-effective analysis*.

The goal of efficiency underlies CBA, but politicians and even economists often strive to include other values when evaluating proposed policies to solve social issues. Even if efficiency tends to be the most relevant goal in policy analysis, other important goals may be: equality of opportunity of outcome and opportunity, expenditure constraint and political feasibility. When goals besides efficiency are relevant and these goals cannot be measured in monetary values a *multigoal analysis* could provide a proper framework. Additionally in special cases where the only goal is to find the outcome of efficiency and equality a *distributionally weighted CBA* would be an appropriate option.

For the purpose of this study a cost benefit analysis is chosen since it seems possible to put a somewhat adequate monetary value of all the costs and benefits included in the model. Also since the main goal of the study is to find weather locally produced is the most efficient alternative for the municipalities in northern Dalarna.

6. Cost benefit analysis of alternative scenario

This analysis will be an ex ante CBA where two alternatives are compared: *the status quo-alternative* and *the second alternative*. The ex ante type of CBA is constructed to help select the best projects, or as in this study - decide weather to go through with the second alternative or not. The first *status quo-alternative* refers to the situation where municipalities keep their purchasing pattern of pork as it is today. As shown in figure 3 the origin of purchase of pork is currently as follows; 3 percent locally produced, 47 percent Swedish and 50 percent imported. In order to simplify calculations, it will be assumed that no procured pork is locally

produced in the *status quo-alternative*. That will result in a scenario where about 50 percent is Swedish and 50 percent is imported.

The *second alternative* will identify a scenario where procured pork is solely locally produced. That means that 100 percent of the municipalities purchases of pig meat consist of locally produced pork. All costs and benefits will then be monetized from the municipalities prospective.

In the next sections will costs and benefits be identified in order to measure the expected changes in social net gain from the *status quo-alternative* to the *second alternative*. Costs in the status-quo alternative will therefore be equal to zero where as the costs in the second alternative will be the additional costs of purchasing locally produced.

6.1 Costs and benefits

The purpose of the study, as mention in the introduction, is to find which alternative that generates highest social net gain. In order to estimate social net gain, each cost and benefit must be specified and calculated for separately. The costs and benefits considered in the alternatives are listed in the table below.

Table 2. Costs and benefits for the different alternatives

	<i>Costs</i>	<i>Benefits</i>
Status quo-alternative		Animal welfare <i>WTP for externality</i>
Second alternative	Locally produced pork <i>additional costs for purchasing locally produced pork</i>	Producer surplus, <i>welfare effects on local producers</i> Animal welfare <i>WTP for externality</i> Opened landscape <i>WTP of public good</i> Jobs <i>opportunity cost of unemployment</i>

The costs in the *second alternative* will be represented by the additional costs of purchasing locally produced pork.

The benefit producer surplus will be calculated according to the welfare change local producers experience when there’s an increased demand of their products.

Both animal welfare and opened landscape can be defined as public goods. In order to define to what extent the market for a public good has, one must consider whose individual marginal benefit to include. Should it be restricted to those living close to the good or extended to the whole country or even further? This CBA is viewed from the local authorities prospective and in order to achieve efficiency when allocating the local resources it’s necessary to capture all pareto-relevant impacts. The density of use value for some public goods will rationally be higher closer to that public good (Bateman, I.J., et al, 2006). Since users in general hold higher values than non-users, one would expect average use values to

decay with increasing distance from that site. This occurs partly due to distance and travel time will increase the cost of “using” a site and also it may be that the availability of substitutes increases with distance, lowering the opportunity costs. Although it clearly depends on what type of site one is referring to.

Opened landscape is a broad term of a public good that can be found all over Sweden, and whether it’s related to use or non-use value might depend on where you live. Considering the local authority prospective of this study, the use value of opened landscape will be related to the site within the geographical scope of northern Dalarna. If assuming distance decay is present in this matter, the benefit of opened landscape will only be accounted for in the *second alternative* where all pig meat is locally produced. If locally produced pig meat experience a higher demand, the public good opened landscape might increase in northern Dalarna and the use value of this increase stand as a pareto-relevant impact. Although it might exist a non-use value of the opened landscape good in rest of Sweden, this possibility will not be taken into account due to limitations of this study and the reasoning in the section above.

Animal welfare on the other hand may also be related to non-use and use-value. However since individuals’ marginal benefit of animal welfare might not change profoundly depending on where you live, distance decay could not be applied in this case. It will be assumed that the pareto-relevant benefit of animal welfare is related to all pig meat production in Sweden. That indicates that the benefit will be monetized in both the *status-quo alternative* since 50 percent of the pig meat is produced in Sweden in that scenario and in the *second alternative* where 100 percent of the pig meat is locally produced i.e. produced in Sweden.

Jobs are calculated for as an opportunity cost, which is the cost of an alternative use of inputs society must give up to pursue a certain action (Boardman, et al., 2010, p.99). For labour that might mean the social cost that the government don’t have to spend on an unemployed when he or she finds a job.

6.1.1 Welfare effects

In order to find the welfare effects of the *second alternative*, consumer and producer surplus are good measurements (Perloff, 2007, p.131.) Consumer welfare is the benefit from consuming a good in excess of the cost of it. The difference between what a consumer is willing to pay and the actual price, put in monetary terms, is the consumer surplus (CS). i.e. the SEK value of the extra benefit the consumer receive from the transaction beyond its price. In this study consumer welfare (consumers being the municipalities) in consumer surplus measurement will not be considered due to limitations of time. Therefore we assume pork to be a homogenous product from a food product point of view. This assumption is done according to a study by Wier et al. (2005) on what drives consumers to purchase organic foods, distinguishing *private* from *public* valued attributes. Organic attributes, similar to locally produced attributes, are aggregated either to use-values or non use-values. Use-values are defined as *private good* attributes enjoyed when actually eating the product, e.g. related to taste, freshness and health. Where as non use-values are *public good* attributes enjoyed separately of actually eating the product, e.g. environmental attributes and animal welfare. The quite unexpected results showed that *public good* values are assigned roughly twice as much important relative to *private good* values. In theory it means by choosing only locally produced, municipalities basically shift their demand from imported/Swedish pork to locally produced. As a result they will face a price increase for the same product. In the result part of this study the estimated benefits for shifting to locally produced will be added in order to see if the price increase is justified.

6.1.2 Additional cost of buying locally produced pig

To find the additional costs of buying locally produced pig, it must first be established what the total demand of pork meat is in the municipalities. In order to account for the additional costs when changing from the *status quo-alternative* (50 percent Swedish pork and 50 percent imported pork) to the second alternative (100 percent locally produced pork) also average kilo price for Swedish, imported and locally produced pig meat must be found.

The data set used to find total demand and prices for Swedish and imported pork meat comes from the central purchasing body in Mora. It's important to realize that the dataset do not cover the whole share of procured food in the municipalities, it only represents what the wholesaler Menigo supplied to the municipalities. The food manager in Mora, Anna Jansson, states that Menigo is the largest supplier of procured food to the municipalities and that data from other suppliers are not public. Therefore it's assumed that the data set will still give a fairly reliably picture of the situation.

Calculations from the data set give a total amount of purchased pork meat in 2013 of 18535 kg for a total cost of 1031446 SEK. In the total estimated for both price and amounts of kilo, different types of pork are included. The types of pork included are: bacon, tenderloin, ham, cold cuts and falu sausage. All these types of pork are summed up to find an average price of pork meat. All estimations are listed in table 3 below.

Table 3. Cost estimates for pork meat per kilo depending on origin. Source: Own calculations based on data for public procurement in the municipalities for 2013.

<i>Origin</i>	<i>Price per kilo in SEK</i>	<i>Amount purchased in kilo</i>	<i>Total cost in SEK</i>
Sweden	58	9331	543634
Imports	53	9204	487812
	SUM	18535	1031446

Due to calculations in table 3 total consumption of pig meat is 18535 kg, which represent total demand in both alternatives. In the *second alternative* it means a demand of locally produced pork meat of 18535 kg. In order to find the additional costs of purchasing only locally produce, one must find an estimated average price for locally produced pork. Since the data set from the central purchasing body in Mora included some purchases from local producers, the average kilo price derived from that could be used as an indicator. However, since the purchase is very small and only consisting of one type of pork meat it will not generate a valid average price of locally produced pork. To calculate a dependable average price of locally produced pork meat a larger number of different types of pork must be included. Therefore will a comparison between prices of Swedish and locally produced pork in stores be used as an estimate.

Table 4. Price differences between Swedish and locally produced pork meat. Source: Own observations from ICA Maxi in Borlänge.

<i>Type</i>	<i>Swedish</i>	<i>Local</i>
Tenderloin	49,90	82,90
Smoke-cured loin of pork	84,90	119
Pork chop	89	94,90
Bacon	82,14	139
Falu sausage	31,25	42,71
Sum	337,19	384,58
AVR. SEK/KG	67	77

The prices are collected from a local store in Dalarna. The selection of what types of pork meat to include are done according to the ones included in the data set from Mora. Almost the same ones are included in order to get a correct ratio of the price difference. Due to the prices in table 4, we can find the price difference between locally produced and Swedish meat to be:

$$77 - 67 = 10 = 10/67 = 15\%$$

The price difference in percent, %_{diff}, will then be added to the current average price of Swedish pork, P_s, paid by municipalities to find the estimated average price of locally produced pork, P_L, paid by the municipalities.

$$P_s * \%_{diff} = P_L$$

$$58 * 1,15 = 67 \text{ SEK}$$

What we also can read from the observations from ICA Maxi is that there's a higher average price of Swedish pork per kilo in stores compared to what municipalities pays. Even if the average price of both Swedish and locally produced pork naturally will be higher in stores, we assume the percentage price difference to be the same regardless of place of purchase.

In table 5 below is the expected cost for the *second alternative* presented.

Table 5. Expected costs for the alternative scenario

Origin	Price per kilo in SEK	Amount purchased in kilo	Total cost in SEK
Local	67	18535	1241845
	SUM	18535	1241845

The additional costs for the *second alternative* are then 1241845- 1031446 = **210339**. That means that total price increase of:

$$210339/1031446 = 20\%$$

6.1.3 Benefits for producers

When changing from the *status-quo alternative* where the total demand of pig meat is met by 50 percent Swedish and 50 percent imported meat, to the *second alternative* where total demand is met by 100 percent local produced meat, a large net gain for local producers will take place, at least in the short run. In order to measure the beneficial net gain for local producers in the *second alternative*, producer surplus (PS) will be estimated.

In figure 4&5 below is the *status quo-alternative* illustrated. The demand curve will not be taken into account due to discussions in section 6.1.1. The Supply curve in the *status quo-alternative* is assumed to be perfectly elastic since the municipalities' demand of pork meat is rather small and has no impact on prices at neither national nor international level. Price will then be placed on the supply curve and PS for local farmers in the *status quo-alternative* will be equal to zero.

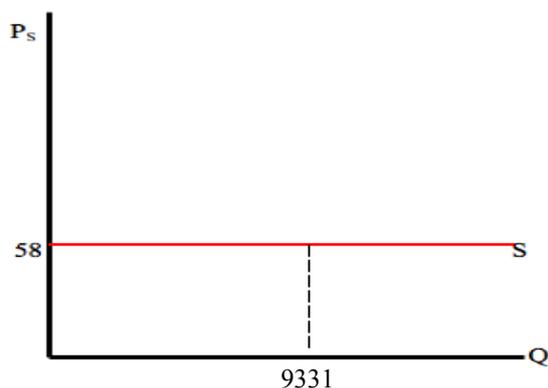


Figure 4. Supply curve for Swedish pork in the municipalities

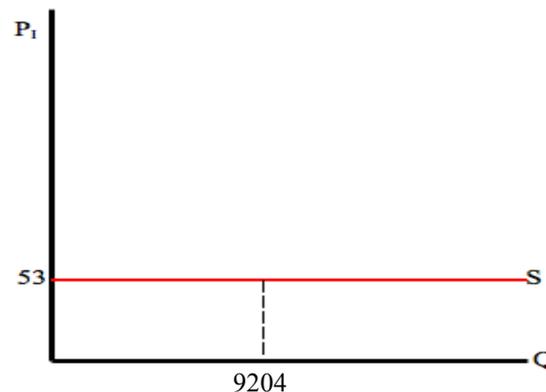


Figure 5. Supply curves for imported pork in the municipalities

To find how a change from the *status-quo alternative* to the *second alternative* will affect local producers in PS measurement, the supply curve for locally produced pork is illustrated in figure 6. Since the quantity supplied by local producers is more limited compared to quantity supplied by Swedish and international producers an upward sloping linear supply function is assumed in figure 6. An upward sloping supply curve indicates that a change in demand effect the price, which is valid to assume when there are only a few producers. The supply curve starts in the origin, meaning that price and quantity starts with equal zero values. It's assumed that the supply curve to start in the origin because the actual supply of locally produced pork is unknown and in order to simplify calculations.

A shifted supply curve from perfectly elastic in figure 4&5 to a unit elastic supply curve in figure 6 is because locally produced pork has an impact on the price. Due to the change in supply curve, we can estimate the monetary value for the PS. In the *second alternative* the marginal cost (MC) for kilo pork will increase to 67 SEK. Since the demanded quantity stays the same the increasing MC will result in higher total costs. The net gain for producers in the *second alternative* is calculated as producer surplus below.

$$P_L \times Q \times 0,5 = + \Delta PS$$

$$67 \times 8535 \times 0,5 = \mathbf{285923 \text{ SEK}}$$

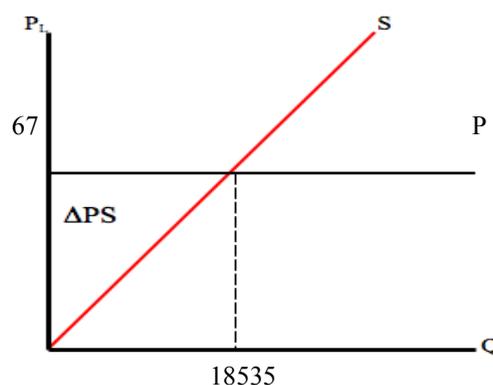


Figure 6. Supply curve for the alternative scenario

6.1.4 Animal welfare

Comparing Swedish and imported pork there are different standards regarding animal welfare (Ryegård, O., 2013, p.24). Swedish production rules are more significant in animal welfare compared to the minimum directives in the EU. In the table below are the differences in rules between EU and Sweden listed.

Table 6. Difference in ruling for pig production Sweden vs. EU. Source: Own illustrations based on LRF (2009)

Rule for:	Sweden	EU
Tail docking?	Prohibited.	Allowed
Fixation of the sow? Number of days per year	No. Prohibited. Safety gates might be used occasionally	Yes 80 ≈ 360
Use of straw?	Yes, for all pigs	Usually not
Is the sow able to perform nesting behaviour at farrowing?	Yes	No
Space for sow with piglets?	6m ²	3-4m ²
Gestation crate?	Fixation is prohibited. Always access to solid floors.	Yes
Weaning age?	4-5 weeks	3 weeks

One of the benefits of purchasing locally produced pork is the fact that the production is more animal friendly compared to imported pork. However when incorporating stricter animal welfare regulation into the production, additional costs which will affect the price of pork for consumers. Thus, for producers to stay competitive there has to exist a demand for products with animal welfare attributes. Hoffman (2000) means that the Swedish demand for domestic meat products might reflect a higher belief for national production standards. Since Sweden has stricter production regulations there should exist a positive willingness to pay (WTP) for animal welfare attributes.

Liljenstolpe (2008) has done a demand analysis concerning this WTP, where welfare attributes among consumers that buy pork is estimated by applying a random parameter logit model (RPL). RPL is often used to estimate WTP since it allows for individual ranking of WTP which makes it possible to estimate the distribution of it and therefore also its diversity (Liljenstolpe, 2008, p.68). The objective of the study was to evaluate animal welfare attributes and animal friendly production standards in the Swedish pig production. The welfare attributes included in the model was: transportation, housing systems, feed, castration, stock size, mixing of pigs, and improved environment. Comparing the differences in ruling of animal welfare shown in table 6, with the included attributes in Liljenstolpes study one can find some differences. For example are the ruling differences not including transportation and improved environment.

Liljenstolpe is using a choice experiment data and therefore it might be problems with hypothetical bias since respondents tend to overstate their WTP. When using the results from her study one must keep in mind that the results will be overestimated. Another problem with using Liljenstoles (2008) results is that there's no estimation of the data combined to predict the national WTP for all attributes for animal welfare. The predicted WTP are for attributes individually. Liljenstolpe states that the WTP values for different attributes cannot be summed, and therefore a total value of WTP cannot be obtained by adding all values. However since there are no better estimates of a total value of WTP for the Swedish welfare attributes to be found within the limitations of this study, we assume that a total value of WTP can be found by summing all values.

According to Liljenstolpes (2008) will the average value WTP for each attribute connected to the difference in legislation for animal welfare be 30 SEK/kg for filet of pork. At the time of the survey in 2002 the average price on domestic filet of pork was 159 SEK/kg. That gives a percentage WTP of:

$$30 \text{ SEK}/159 \text{ SEK} = 19\%$$

Given that the average price per kilo Swedish pork in the municipalities of the study is 58 SEK, the unit value of animal welfare per kilo is:

$$58 \times 19\% = 11 \text{ SEK/kg.}$$

Taking total pork consumption in the area times the price of animal welfare per kilo will estimate the total monetary value of animal welfare to:

$$11 \text{ SEK} \times 18535 \text{ kg} = 203885 \text{ SEK}$$

Since some share in the *status quo-alternative* is of Swedish origin, the animal welfare estimate will be counted as a benefit for this alternative as well. The amount of Swedish pork is 9331 kg. In monetary values of animal welfare that is:

$$11 \text{ SEK} \times 9331 = 102641 \text{ SEK}$$

6.1.5 Opened landscape

One of the positive externalities with local pig production is that it's beneficial for opened landscape. How large the landscapes values are depend upon; the size of the cultivated landscape, in hectare; the quality of the landscape; and on consumers' preferences regarding these objective values. In 1998 Hasund (Dabbert, S. et al.,1998) presented an empirical study based on evaluation of permanent policy change for preserving landscape elements in Sweden. Since politicians attempt to design a policy that leads toward improved social welfare it requires knowledge of the level of benefits generated by a public-good resource. In order to find the benefits generated Hasund used a contingent valuation method (CVM), to estimate WTP for opened landscape. In the results Hasund found that the WTP for preserving all landscape elements was 1700 SEK/ha (Dabbert, S. et al.,1998, p.68). This is an average figure and it should be underlined that the frequency of elements and the value of the objects might vary from place to place.

In order to adjust these values to today's value we need to correct for inflation and measure prices relative to an overall price level (Pindyck & Rubinfeld, 2009, s.12.). To do this we must measure in real rather than nominal terms. The real price of a good is its absolute price, where as the nominal price is the price adjusted for inflation. Using the consumer price index (CPI) we can find the nominal price. The CPI measure is taken from an index provided by Statistics Sweden (SCB). Below are the calculations presented in a formula where P_0 represent the nominal price; CPI_1 is current index value; CPI_0 is the initial index value; and P_1 represent the real price. $CPI_{1\&0}$ is the annual average of CPI measurements.

$$P_0 \times \frac{CPI_1}{CPI_0} = P_1$$

If CPI_0 was 248,5 in 1994 and CPI_1 was 314,04 in 2013, the value of landscape elements per hectare (ha) in 2013 is:

$$1700 \times \frac{314,04}{248,5} = 2148,36$$

To be able to calculate for this benefit in the CBA there must be a number of how many hectares of opened landscape one pig contributes to. In correspondence with current pig farmers in Dalarna, each pig requires 0,03 ha of grain cultivation for feed. Further the estimated kilo meat produced per pig is about 45kg for the farmers in Dalarna. The demand for pork meat is 18535kg according to table 5. In number of pigs that is:

$$\frac{18535kg}{45kg} = 412$$

Taking the number of pigs multiplied the ha per pig ratio and then multiplying by the WTP for opened landscape, the total value of open landscape in the area will be found.

$$412 \times 0,03 = 12,36$$

$$12,36 \times 2148,46 = 26554,97$$

These calculations found that the total value of open landscape related to pig production in the *second alternative* is **26555 SEK**. This result is yet only based on the production of grain used as feeding for the pigs; still many of the pig farms have supplementary cultivated land for other uses contributing to open landscape.

6.1.6 Jobs

Pork farmers in Sweden have faced mayor problems with profitability during the last couple of years. As a result 25 percent of them have had to put down their business since 1995. The problems of keeping domestic pork industry alive are rooted in many problems: a high value of the Swedish crone, increased prices on feeding and strict animal welfare rules. Even if there are only four pork farmers left in Dalarna they still play an important role in the society. According to Posner (2011) could a regulation that causes less-than-massive unemployment be socially undesirable since it produces marginal regulatory benefits that are less than the costs of having unemployment.

To find the opportunity cost of labour in a market, considerations must be made if the labour is already employed, if it's unemployed and to what extent the labour hired reduces the number of unemployed. In the *second alternative* increasing demand for labour might not be fulfilled only from the ranks of unemployed (Boardman et al. 2010). In 2013 was the unemployment rate 7,6 percent in Dalarna (SCB, 2014). However if assuming that the unemployment rate for farmers in Dalarna is high, about 25 percent. That means 25 percent the additional labour force needed will taken from the ranks of unemployment. The additional 75 percent of the labour needed, assumed to be taken from people having similar employments, receiving the same salary. In order to make this assumption the position the people already in labour is transferring from must be fulfilled with another person.

Finding how much extra labour the *second alternative* requires, data on how many working hours one slaughter pig required is needed. According to a study made by the Swedish PIG-project, will the working hours per pig/year vary between 15-17 hours (Andersson, 2004). If the annual working time is 1700 hours per year, one person can handle 100 pigs. As discussed and calculated in section 4.1.3. the increasing demand in numbers of pigs in the *second alternative* is 412. If one person can handle 100 pigs/year, the *second alternative* will increase labour force relative to $100/412 = 4,12$ persons.

Research on unemployment costs (Ekonomifakta, 2006) including both direct costs (unemployment insurance etc.) and indirect costs (loss of revenue etc.) shows that one unemployed costs the society 255422 SEK/year. Assuming the alternative scenario would generate 4,12 new job opportunities where 25 percent was taken from the ranks of unemployed, it would result in an opportunity cost of:

$$4,12 \times 0,25 = 1,03$$

$$1,03 \times 255422 = \mathbf{263085}$$

7. Results

The *status quo-alternative* represents what the origin of pork meat is today in the municipalities, 50 percent Swedish meat and 50 percent imported. The *second alternative* refers to the situation where the municipalities' purchase 100 percent locally produced pork. In this part of this study will the change from the *status quo-alternative* to the *second alternative* be shown in monetary terms. The aggregated costs and benefits for the *status quo-alternative* and the *second alternative* are listed in table 7.

Table 7. Costs and benefits of the two alternative scenarios

	<i>Costs, alt.1 status quo</i>	<i>Benefits, alt.1 status quo</i>	<i>Costs, alt. 2</i>	<i>Benefits, alt. 2</i>
Additional costs, local pork	0		210339	
Animal welfare		102641		203558
Opened landscape				26555
Producer surplus				285923
Jobs				263085
Sum	0	102641	210339	779121

Social net benefit (SNB) in the *status quo-alternative* is **102641**; in the *second alternative* it's B-C: 779121 – 210339 = **568782**. This results in SNB (alt1.) < SNB (alt.2), which means that the *second alternative* of purchasing only locally produced pork, should be taken.

$$568782 - 102641 = 466141$$

$$466141 / 102641 = 454 \%$$

As shown in the results the social net benefits are about 454 percent larger in the *second alternative* of only locally produced pork relative to the *status quo-alternative*. This result might be quite overstated and thus further sensitivity analyses are necessary.

8. Sensitivity analysis

Some of the benefits are calculated with uncertainties, therefore three sensitivity analysis will be carried out as a way of investigating the robustness of net benefits estimates to different resolution of uncertainties. The purpose these sensitivity analyses are to recognize the underlying uncertainty (Boardman et.al, 2010).

8.1 Sensitivity analysis 1

The monetary value of the animal welfare benefit is uncertain out of two prospective; one, the WTP-value (of Swedish animal welfare attributes) used from the underlying study is predicted with large hypothetical bias combined with highly uncertain assumptions; second, animal welfare laws are the same for Swedish as for locally produced pork and therefore it might not be a strong base variable for changing public procurement from Swedish pig meat to locally produced.

As mentioned in section 6.1.4 the WTP value of animal welfare attributes should be interpreted with much caution since there's a problem with hypothetical bias, given that respondents tend to overestimate their WTP. Further was highly uncertain assumptions done to simplify estimations in the study. These assumptions was based on the possibility to sum all individual WTP attributes in order to get a total value of WTP for Swedish animal welfare. This type of assumption will however result in a very uncertain value, since the researcher estimating individual WTP declare it's not possible to do so.

Animal welfare laws are the same regardless of the pork is Swedish or locally produced. Since a share of the pork purchased in the *status-quo alternative* has Swedish origins the solution was to monetize that share with the same animal welfare value per/kg pork as in the *second alternative*. However the question is therefore if it's relevant even including an animal welfare value when estimating benefits for locally produced pork?

In sensitivity analysis 1 the animal welfare benefit is taken away from the model to see if the outcome of the different scenarios changes. In the table 8 below are the new total values of benefits in each scenario listed.

Table 8. Revised calculations by eliminating the animal welfare benefit

	<i>Costs, alt.1 status quo</i>	<i>Benefits, alt.1 status quo</i>	<i>Costs, alt. 2</i>	<i>Benefits, alt. 2</i>
Additional costs, local pork	0		210339	
Opened landscape				26555
Producer surplus				285923
Jobs				263085
Sum	0		210339	575563

From the result of this study we find that the *status quo-alternative* has 0 SNB and the *second alternative* has SNB equal to $575563 - 210339 = 365224$. Taking away the benefit of animal welfare gives the same conclusions as in the base analysis; the alternative of locally produced is better from the net social benefit prospective. Further will this sensitivity analysis give a more realistic base when choosing between Swedish and locally produce pork.

8.2 Sensitivity analysis 2

The producer surplus value is the highest among all benefits and is therefore interesting to take a closer look at. Producer surplus is an estimate calculated from the supply curve in relation to the price. Since the current supply of locally produced is unknown, it might result in a higher value compared to if supply was known. In this analysis will a 50 percent reduced value of PS compared to the base analysis to see what the effects on the results will be.

Table 9. Revised calculations by adjusting producer surplus

	<i>Costs, alt.1 status quo</i>	<i>Benefits, alt.1 status quo</i>	<i>Costs, alt. 2</i>	<i>Benefits, alt. 2</i>
Additional costs, local pork	0		210339	
Animal welfare		102641		203558
Opened landscape				26555
Producer surplus				(285923-50%) =142962
				=142962
Jobs				263085
Sum	0	102641	210339	636160

Due to the results in this analysis we find that the SNB for the *status quo*-*alternative* stays the same: **102641**. As for the *second alternative* the new SNB is: $636160 - 210339 = 425821$. That means that the difference between the alternatives is smaller ($323180 = 315\%$) but still the *second alternative* performs a significantly larger social net benefit.

8.3 Sensitivity analysis 3

To measure the opportunity costs of labour is usually a very complex task since it's depending on many factors. One has to predict where the newly expected work force will come from, a prediction not easy to make. In order to be somewhat certain a deep analysis must be made on the current job market of where the new labour is expected to come from. When monetizing an opportunity cost for labour the social costs of current unemployment must be accounted for when hiring from the ranks from unemployment. When hiring a person with a job the difference in salary must be measured as well as if another individual fulfils the position the person is leaving.

When measuring costs and benefits for some municipalities one must question if the social costs of unemployment are burden on a local level (the municipalities) or a national level. Maybe they share some of the costs and then it must be known to what extent.

Since the opportunity cost of labour is very complicated to predict, reducing the benefits of jobs with 50 percent will be done in sensitivity analysis 3.

Table 10. Revised calculations by adjusting the benefit jobs

	<i>Costs, alt.1 status quo</i>	<i>Benefits, alt.1 status quo</i>	<i>Costs, alt. 2</i>	<i>Benefits, alt. 2</i>
Additional costs, local pork	0		210339	
Animal welfare		102641		203558
Opened landscape				26555
Producer surplus				285923
Jobs				(263085-50%) =131543
				=131543
Sum	0	102641	210339	647579

The result looks quite similar to the results in sensitivity analysis 2. SNB for the *status quo-alternative* stays the same: **102641**. As for the *second alternative* the new SNB is: $647579 - 210339 = 437240$. That means that the difference between the scenarios is smaller but even here the *second alternative* performs a significantly larger social net benefits.

9. Discussion

The purpose of this study was to find whether it's economically viable to choose only locally produced pork for the municipalities in northern Dalarna. According to the results of this study the answer is yes.

As mentioned in the sensitivity analyses will however the valuation process stand as a critical part of this analysis. Evaluating externalities and public goods is of great importance when measuring societal net gain. In this study are the included externalities and private goods measured with WTP. Since WTP has a tendency to result in overestimated values, which is presumably very evident in this analysis, must the conclusion of this analysis be treated with caution.

It's likely that a cost benefit analysis of public procurement of locally produced pork performed on a higher level, where additional parameters and better specified costs and benefits is an option, ought to result in a more dependable result. In an analysis situation like that a deepened comprehensive analysis is required, including reliable WTP-values.

The trend of having an increasing volume of imported food in the public kitchen is a rather complex question. On one side are the arguments for price pressure, not spending much money on food products means resources can be put somewhere else. It's a question of how the allocation of society's resources generates the most efficient outcome. On the other side are the arguments of the underlying impacts the choice of origin of food has and how to evaluate these underlying impacts. If imports of pork continue to increase most of the Swedish pork producers will not be able to continue their business. Having a globalized food market the natural outcome will be that each country will gain marketing power for the product they can provide at lowest price. The problem with the lowest price for food products is that it often reflects the quality of the food and animal welfare.

Price is still the depending variable when municipalities choose which tender to accept in the procurement process. Although, when taking a broader socioeconomic view of the issue, choosing locally produced has large economic incentives to be the most viable option according to the results of this study.

In a previous study, mentioned in the introduction, by Jonasson and Andersson (1997) it's found that even if Danish producers might deliver pork products at a lower price compared to Swedish producers, their production process resulted in more infected pigs. The Swedish pig was shown to have a 10 percent better growth rate compared to the Danish. This result is very interesting in the sense that strict animal welfare means more healthy pigs which could be economically beneficial in the long run.

In this study it's been established that there is a tendency of growing interest among Swedish municipalities for locally produced food. The local producers however find the barriers to be apart of the local procurement too complicated. If municipalities claim that they want to purchase more locally produced and if the local producers want to sell their products to the public market, why is the imported share of procured food still increasing? In order to find a solution for the municipalities and local producers to meet the following four steps on the municipality's part could be made: One; in programs, plans and policies should local food be stressed as a relevant planning factor. Two; increase the flexibility in the procurement process to give local producers various and better opportunities to respond to contract notices. Three; inform and help local producers regarding the procurement process and the municipality's demand for local products. Four; investigate legal possibilities to include local products in the procurement contracts.

In conclusion of this discussion the lack of data and the valuation process has been the most critical ones. Further research must be seen as relevant since the question of public procurement is a topical issue in the public debate. One important impact discussed in

the public debate is the health related issues on what type of meat to purchase. In this study the health issue has not been seen as a relevant parameter according to the study discussed in section 6.1.1, where it was clarified that consumers choose organic meat based on non-use values rather than use values. Therefore environmental considerations are more important to consumers compared to taste and health benefits from actually eating the meat. However, if health issues related to what we eat become a problem in Sweden, consumer's preferences when choosing organic as well as locally produced pork meat might change. In such a scenario health impacts should be an obvious parameter to include in further research.

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