INVESTMENT DECISION SUPPORT SYSTEM FOR HIGH QUALITY CONTROL POSTS IN EU

Willy Baltussen[1], Wil Hennen[1], Monika Gębska[2]

[1] LEI, The Hague, The Netherlands,
[2] Warsaw University of Life Sciences (SGGW), Warsaw, Poland

Abstract

In 2010 an EU subsidy program started to create high quality control posts in Europe. Control posts are companies offering facilities for animals to rest and eat during long distance transport. They also offer facilities for trucks, drivers and competent authorities. A decision support program has been developed to support owners of control posts with their investment plan. The aim of this computer program is to calculate what increase in truckloads or in price per truckload is needed to justify the investment plans. The program was tested at two control posts participating in the EU project in Poland[1]. Both owners appreciated the added value of the program and suggested some improvements.

Keywords: control post, investment, BEP, mathematical model

1. Introduction

The proportions of the regional production of animals in Europe are different from the respective regional consumption. As a result, animals and meat are transported all over this area. In the period 2005-2009 the number of cross-border truckloads of live animals within EU increased from 315,000 to almost 400,000 (excluding poultry). About two thirds of this transport is shorter than 8 hours, however, 16,000 to 24,000 truckloads so called "long distance transport" last more than 24 or 28 hours (Baltussen et al, 2011). About 40% of these are cattle truckloads, about 40% are horses for slaughter truckloads, about 20% are pigs and about 5% are sheep and goats truckloads. Figure 1 shows the main long distance transports routes of cattle in 2009 in EU. The tendency was that during the period 2005-2009 the total number of consignments was increasing while the number of long distance transport has been decreasing since 2007.

The main routes of animals transported within EU have remained the same for a long time. The long distance transport has to stop at so called control posts, and has to unload the animals, feed them and let them rest for 24 hours. At the beginning of 2010 there were 157 control posts on the official EU list (approved by the EU). However, only 113 out of 157 investigated control posts were still in operation. Data shows that 5 of them where suspended and 39 were closed down because of the lack of customers. The majority of the control posts in operation also report low occupancy. This tendency concerns all control posts on all routes no matter which species they deal with. Only four control posts reported the use of more than 60% of the full capacity during the whole year (Gebrensbet et al, 2010).

Transport of live animals including stops at control posts is regulated by Directive 1/2005/EC. This regulation was evaluated in 2011 (Baltussen et al, 2011). The main conclusions are that the introduction of that regulation slightly improved the animal welfare during transport especially during long distance transport and at the same time increased the transport costs for live animals.

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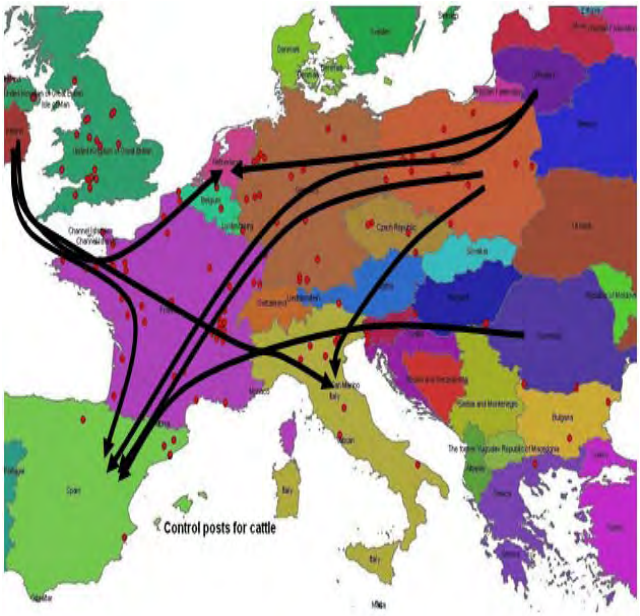

Figure 1. The main routes of long distance cattle transport in 2009 and location of the control posts for cattle Source: Gebrensbet et al, 2010

There are still differences in the implementation, enforcement and penalties for infringements of the Directive by individual Member States which undermine the level playing field for transport companies. This means that transport companies working according to the rules can hardly, or not at all, compete with transport companies who violate the rules.

It can be expected that in the coming years the EU will not change the regulation but will try to enforce it equally in all Member States. One of the effects will be that the number of stops at control posts will increase. The research carried out by Baltussen et al. in 2011 showed that for example about 50% of all horse transport lasting 20 to 24 hours should have stopped at a control post, but it didn't.

Based on a feasibility study (Gebrensbet et al, 2010) the EU stimulated the improvement of the quality of control posts by two subsidy programs (SANCO D5/10753/2010; SANCO 10834/2011). As a result, 11 control posts joined the high quality project in 2011 and additionally 5 control posts joined the high quality program in 2012. The goal of the first subsidy program is to develop a certification scheme for control posts to reach high quality standards with respect to animal welfare, bio-security and facilities for drivers and competent authorities and services for trucks (see Gebrensbet et al, 2010; SANCO D5/10753/2010; SANCO 10834/2011). In the second subsidy program also transport companies are invited to develop a high quality scheme.

Most of the existing control posts have to be rebuilt or renovated to reach the high quality standards. For owners of control posts it is hard to decide if and in what facilities they should invest. It's difficult to predict the number of trucks stopping at their control posts, the willingness to pay for certain services (e.g. truck facilities, drivers facilities, animals facilities). Therefore, within this high quality program a computerized decision support system has been developed to support owners of control posts in their investment decisions. In this article this decision support system is described and two investment plans of control post are given as examples.

2. Description of the model

A certain number of trucks with animals visit a control post a year. Each visit generates variable costs e.g. costs of fodder, costs of water, costs of electricity. The fixed costs grow if additional investments in equipment, buildings and new facilities are needed to enhance the quality of the control post. The costs of the adjustments need to be calculated to justify investment decisions. The additional revenues from the control post need to outweigh the additional costs.

To support an owner of a control post in managerial decision making, an economic model has been developed. The model supports owners in evaluating potential investment projects in two ways. Firstly, it helps the control post owners to decide whether they want to implement a particular investment project. Secondly, it will also help the control post owners to determine the optimal size of the investment. The tool is a deterministic mathematical program that calculates the break-even point for the number of truckloads at varying prices or varying occupancy rates. By "playing around" with various "what-if" situations, the owner of the control post gains knowledge about feasibility of the investment. The model offers the possibility to change the "price per load" (daily allowance per truck load) and to see the economic impact of the change. Thus owners are supported in making justified decisions in order to reach the desired standards.

The model consists of three different sheets for data input, a calculation module (i.e. the mathematical-/economic model) and the main sheet with the output of the calculation. The model is available online, free of charge and requires only Excel 97-2003 or later. It is available in 5 languages: English, German, Spanish, Polish and French. When the user chooses a language, all texts of the model (including buttons) are replaced by texts of the selected language (will be available: http://www.controlpost.eu/joomla/index.php/project-1/2011-05-30-09-54/prototype-break-even-analyses).

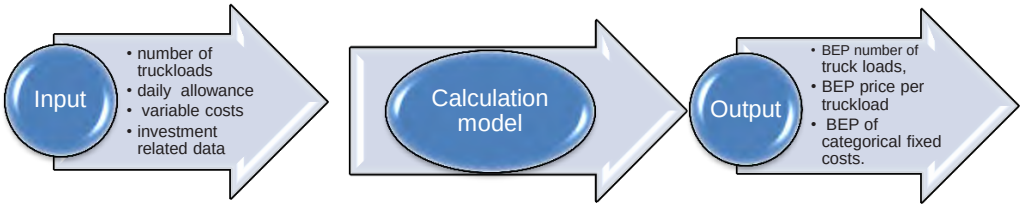

Figure 1. The decision support program for control post investment

2.1. Input

The data input requires information about a specific animal category. In the model eight animal categories are distinguished for the four species: cattle, horses, sheep and pigs. The user has to introduce the figures concerning the current (before-investment) and the future (after-investment) situation (e.g. value of the investment, maintenance). For each investment there is a separate input sheet, to calculate the annual costs. The program provides specific default values for some items, so the investor does not need to estimate them (e.g. 'useful life' or 'rest value' of the investment). The system enables to select the options from the list or enter your own figures.

Some investment costs (i.e. buildings and equipment) are divided into per-animal category and the rest are general investment costs not categorized (i.e. services for trucks, facilities for truck drivers, facilities for competent authorities).

2.2. Calculation module

When the needed inputs are provided, the mathematical model starts to distribute the total amount of occurring costs to the individual animal categories. It is based upon the calculated gross margins of the animal categories. The larger gross margin the animal category produces the bigger the amount of general fixed costs is assigned to the animal category.

The main focus of the model is the break-even analysis. The model calculates three Break-Even Points (BEP) to cover all additional costs (Figure 1). The three BEP are: the number of truckloads at a given price (allowance per day), the minimum price at a given expectation of occupancy and the combination of number of trucks and changing prices (daily allowance). Higher prices, more truckloads or lower value of planned investment will result in a higher level of project justification. Variations in additional costs or prices result in different break-even points. Break-even points for price, for number of truckloads, and for categorized fixed costs are calculated for each relevant animal category A separately:

$$BreakEvenPrice_A = ((YearlyCosts_A + AllocationFixed_A + TruckLoads\_IST_A * GM\_IST_A) / TruckLoads\_SOLL_A) + VariableCosts_A + ExtraVariableCosts_A$$

$$BreakEvenTrucks_A = (YearlyCosts_A + AllocationFixed_A + TruckLoads\_IST_A * GM\_IST_A) / GM\_SOLL_A$$

$$BreakEvenCatFixed_A = TruckLoads\_SOLL_A * GM\_SOLL_A - TruckLoads\_IST_A * GM\_IST_A - AllocationFixed_A$$

where:

$$AllocationFixed_A = AllocationPct_A * GeneralFixedInvestmentCosts$$

$$AllocationPct_A = GM\_SOLL_A / \Sigma_A (GM\_SOLL_A)$$; GM is abbreviation for Gross Margin

$$GM\_IST_A = Price\_IST_A - VariableCosts_A$$

$$GM\_SOLL_A = Price\_SOLL_A - VariableCosts_A - ExtraVariableCosts_A$$

The surplus (i.e. returns minus additional costs) is calculated for each relevant animal category separately from the returns, fixed costs and number of expected truckloads. These surpluses are summed up to yield the total surplus for the after-investment situation. The outcome can be compared with the returns from the before-investment situation.

2.3. Output

Annual costs of the investments for the animal categories as well as general investment items are presented on the main screen of the model. Investments, other costs and allowances are summarized as the difference between IST- and SOLL outcome. The break-even analysis results in three outcome values: break-even number of truckloads, break-even price per truckload and break-even of categorized fixed costs.

2.4. Two examples

The model has been tested on two control posts in Poland participating in the EU project for high quality control posts. Both control posts have been visited in the last 4 years, by 453 and 377 truckloads of animals a year on average. Both control posts can host pigs and cattle. From

table 1 it can be concluded that the number of visits vary considerably from one year to another. Control post 1 was shut for half a year during 2012 because of renovation. Both control posts depend strongly on the transport of pigs from Denmark, Germany and the Netherlands to Ukraine, Belarus, Russia and Kazakhstan and on cattle transported the opposite direction from Lithuania and Poland to Spain and Italy. The transport of pigs is highly uncertain because of import break-downs for safety or political reasons (e.g. to Russia).

The owner of control post 1, considered the investment in stables for pigs and cattle in order to create a high quality control post. He planned double of the existing capacity of stables while the owner of control post 2 considered the investment in a facility for truck wash (see table 2). The total investment for control post 1 and 2 was to 300.000 and 393.000 euro respectively.

The main question for owner of the control post 1 was if the investment in stables for cattle would be justified. The main question for the owners of control post 2 was if the investment in additional facilities for trucks and drivers could be justified by an increased number of expected visits and/or a higher price per visit because of better quality facilities. For control post 1, its owner expects to host between 877 and 1162 truckloads of animals after the renovation. The first one being a pessimistic view and the second a more optimistic one. As a result of investment in control post 1 there was an increase in fixed costs by 44,257 euro. To achieve a break-even point without changing the daily allowance and without using EU funds, 781 truckloads are needed to compensate for the cost increase. In case of participation in the EU project, a subsidy of 69% is given for all the investment (except for land purchase). With the EU subsidy, the break-even point declined to 544 truckloads (table 3). The number of truckloads needed for both break even points is smaller than the number predicted by the owner. They make respectively 47 and 62% of the expected consignments. Therefore, there is high probability that the investment will increase the income of the owner of control post 1.

As a result of investment in control post 2 there was an increase in fixed costs by 50,170 euro. For control post 2 the owner expects annually between 500 and 900 truckloads of animals after the renovation. To reach the break-even point without EU funding and without changing prices for services, 400 truckloads are needed. With the EU subsidies only 236 truckloads are needed to break-even. This makes 26 to 47% of the expected truckloads estimated by the owner (table 3).

Table 1. Number of truckloads visiting two control posts in Poland during the period 2009-2012

Year	Control post 1		Control posts 2	
	Pigs	Cattle	Pigs	Cattle
2009	395	0	284	275
2010	790	8	327	104
2011	123	23	431	34
2012	51	87	468	89
Average	453	39	377	125

Source: control post documentation

Table 2. Investments (in euro, excluding VAT) per control post to reach high quality

Type of investment	Control post 1	Control post 2
Stables	208,180	-
Truck wash	11,500	150,000
Access road and parking space	22,820	80,000
Tractor	45,000	-
Manure storage & fencing	12,500	85,000
Facilities for drivers	-	40,000
Charger	-	38,000
Total investment	300,000	393,000

Source: control posts documentation

Table 3. Break-even analysis CP 1 and CP 2

Specifications	Self financing option		EU funds contribution option	
	Pigs	Cattle	Pigs	Cattle
Control post 1				
Number of truck loads /year before the investment	790	2	790	2
Number of truck loads /year after the investment	790	87	790	87
General fixed costs	44,257		44,257	
BEP (Number of truck loads)	725	56	529	15
BEP (Price per truck loads) [€]	341	247	312	175
Surplus [€]	12,094		40,881	
Control post 2				
Number of truck loads /year before the investment	377	125	377	125
Number of truck loads /year after the investment	377	125	377	125
General fixed costs	50,170		50,170	
BEP (Number of truck loads)	277	125	194	42
BEP (Price per truck loads) [€]	341	300	310	201
Surplus [€]	14,575		38,980	

Source: own calculation

3. Discussion and conclusions

The developed decision support model has proven its value at least for the owners of the control posts where it was tested. By "playing around" with expected numbers of truckloads and with prices per truckload they were able to get insight into the sensitivity of their investments. For both cases, the probability of net profits from these investments is quite high.

The testing of the model resulted also in some suggestions from the users for improvement of the model:

1. Make it more user-friendly. For example, by introducing separate "help-icons" for instructions. For the present model data descriptions and explanations are put in a Manual.
2. Introduce more flexibility. In the model, the stables can be used by one category of animals. In reality stables are used for different species. This complicates the calculations because also investments in stables have to be divided over the species.
3. For the calculation of the profits the number of truckloads is multiplied by the price per truckload. However, the owners of control post use different methods of pricing. Therefore, they suggested adding the possibility of choosing the way of data input-giving either a number of truckloads or a number of animals.

4. References

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