Social and economic impacts of grass based ruminant production

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Abstract

Grass based ruminant production provides multiple benefits to farmers and to wider society. This paper addresses key economic and social factors of grass based ruminant production and illustrates them with national and regional examples from different parts of Europe. Farmers are key actors when it comes to maintaining and improving grass based production systems since they decide on the day-to-day management of the farm. The traditional farm economy model is a model where the income of farmers is a function of the price of the animal products sold, subsidies/direct payments and the associated costs of production. The multiple benefits of grass based production systems to society lead to promising new business models, where farmers are financially rewarded for their added value contributions. This is already put into practise as several societal initiatives have been started, to support rewards for ecosystem services delivered. When developing stimulating initiatives, the mind-set of the farmer should be taken into account, since this is an important influencing factor. Special attention should be paid to young farmers since they represent the next generation of farming.

Keywords: economic, grass based, mind-set, social

Introduction

The EU (28 countries) currently has a permanent grassland area of about 60 million ha (Eurostat, 2017a). Permanent and temporary grasslands represent 40% of the European total utilised agricultural area (Huyghe *et al*., 2014) and a large acreage of these grasslands is exclusively used as ruminant feed. This asset of grasslands is extremely important for the human population since ruminants deliver food for humans as they convert the human inedible plant biomass into high quality edible proteins. Thus, by providing feed to ruminants, grasslands contribute to the feeding of mankind. Additionally, grass based ruminant production delivers a number of other services to society, like carbon (C) sequestration (e.g. Soussana *et al*., 2010; Conant *et al*., 2017) and biodiversity (e.g. Isselstein *et al*., 2005). Thus far, these additional services are not usually taken into account in economic evaluations.

Grass based ruminant production systems are, however, under threat. Under climatically and topographically favourable conditions, the European grasslands area has been significantly reduced during the last 30 years (Huyghe *et al*., 2014). According to the third report of the EU MAES initiative (Mapping of Ecosystems and Ecosystem Services), between 2006 and 2012 the main causes for this process were the conversion of grasslands into arable crops like maize (including for the production of biofuels) and permanent crops (32% of the lost area), the sprawl of urban areas, economic sites and infrastructures (30%) and the withdrawal from farming (17%) (Erhard *et al*., 2016). In many countries, the number of dairy cows decreased in the last 30 years but the milk yield of the individual cows increased during the same period, with the cow number reductions mainly driven by the implementation of the milk quota regime. Up to 2010, the grassland area was estimated to decrease along with the cow population

(Peyraud and Peeters, 2016). Between 2010 and 2016, however, the bovine population slowly grew again by 1.4% (Eurostat, 2017b).

The improvement in individual animal milk production is achieved based on an increasing amount of concentrates and maize in the rations of cows and a declining use of herbage from grassland (e.g. Isselstein *et al*., 2005). More and more farmers have changed to all-year housing and do not provide access to grazing for their cows, e.g. only

- 42% of the German dairy cows have access to pasture (Gurrath, 2011);
- 25% of Danish dairy cows have access to pasture (Van den Pol-van Dasselaar, 2016);
- 11% of Galician dairy cows are in farms where grazing makes a significant contribution to the daily diet (Botana and Flores, personal communication).

In Galicia, for example, López-Iglesias *et al*. (2013) pointed out an increasing rate of a disappearance of farms between 1982 and 2009, with a reduction of two thirds in the number of farms in that period. Of the total land released by farms which had disappeared, more than half was abandoned or was put into non-agricultural use (mainly rapid-growing *Eucalyptus* forests).

Germany and Denmark on the one hand and Galicia on the other hand are examples of the European decrease in grass based production that is caused by two contrasting trends that are currently occurring simultaneously in Europe:

- In some regions, ruminant production systems have intensified leading to more animals per ha of grassland and less grasslands (such as Germany and Denmark).
- In other regions, grasslands have been abandoned and the percentage of the population that lives from grass based ruminant production has decreased (such as Galicia).

Marginal grasslands in several European regions tend to be abandoned, particularly in mountainous and Mediterranean areas, where they can be of crucial importance. Throughout Europe, grasslands are important for the delivery of many ecosystem services like preserving biodiversity, protecting soils against erosion, sequestering carbon, preserving the aesthetic value of cultural landscapes, the traditional cultural heritage, the attractiveness for tourists and thus, contributing to maintain the local population density. Both management intensification and abandonment have been found to be detrimental concerning biodiversity and aesthetic value (Köhler *et al*., 2005; Rey Benayas *et al*., 2007; Lindemann-Matthies *et al*., 2010; Niedrist *et al*., 2009). For this reason, ecologically, socially and economically sustainable management schemes are required, even combining different management intensities at the farm level, to ensure on the one hand a further management of grasslands by the farmers and on the other hand the continued maintenance of ecological hotspots.

This study presents key factors with respect to sustainable development of grass-based ruminant production which are illustrated with national and regional examples from different parts of Europe. The paper firstly describes the farm economy. Secondly, the importance of grass based ruminant production to society is addressed together with societal initiatives to promote grass based production systems. Farmers are key actors when it comes to maintaining and improving the important functions of grassland based ruminant production. They are key actors, because they decide on the day-to-day management of their farm. In this way, in fact, a small percentage of the population is managing benefits for the whole society. The importance of the mind-set of the farmer for management decisions is discussed. Finally, a new and emerging business model to stimulate grass based ruminant production is discussed.

Farm economy, the old business model

If farmers are expected to maintain grasslands, it is an essential condition that they will have a reasonable income. Agricultural markets are perfectly competitive and so individual farmers cannot influence the price of products sold (unless they are in a situation where they sell directly from the farm). In economic theory, the law of supply and demand is considered one of the fundamental principles governing an economy. If supply increases, prices will tend to decline, other things being equal, and vice versa. In the 'old' business model (Figure 1), which is the model that was most common throughout Europe and remains in many areas today, the income of the farmer is based on the price for animal products sold, less the costs of producing these animal products. Furthermore, subsidies may play a role. Traditionally, the CAP supported crop production more than livestock and may therefore have contributed to an historical decline in grasslands. Nowadays, in many European countries, the application of CAP results in subsidies promoting grassland based systems (at plot or at farm level). These subsidies can be a major part of the farmers' income. Where individual farmers cannot easily influence the price of animal products, a low-cost strategy (Porter, 1980) is a good choice. The assumption is that farmers strive to reach maximum profit.

There are huge differences in income on farms with grass based ruminant production. These differences are related to differences in farm characteristics in combination with differences in pedoclimatic conditions. In north western Europe, grass based ruminant production is mainly seen as an economic activity with low costs and high farm profitability (Dillon *et al*., 2005; Peyraud *et al*., 2010). An example of this is provided by Läpple *et al*. (2012), who showed that increased grazing and reduction in concentrate feed usage improved profitability levels on Irish dairy farms. The findings indicated that lengthening the grazing season offers a cost-saving alternative on many Irish dairy farms, which could contribute to strengthening the competitiveness of the Irish dairy sector. For example, lengthening the grazing season from the average of 233 days to 243 days would decrease the direct costs of production from 14.6 to 14.2 cents per litre for the average farm. A key factor affecting the economic sustainability of grass based ruminant production in this model is the proportion of grass in the diet. This is also illustrated in Figure 2, where a high proportion of grass in the diet of dairy cows corresponds to low total production costs.

Some regions of Europe do not have such satisfactory conditions to focus almost exclusively on grass. The various farm specific and pedoclimatic conditions that are present in Europe affect the potential for high performing grasslands and hence influence profitability. In the Alps and other marginal areas, for example, topographically unfavourable features such as slope steepness results in limits to mechanisation (Sauter and Latsch, 2011), whilst climatic limitations such as low temperatures due to increasing altitude

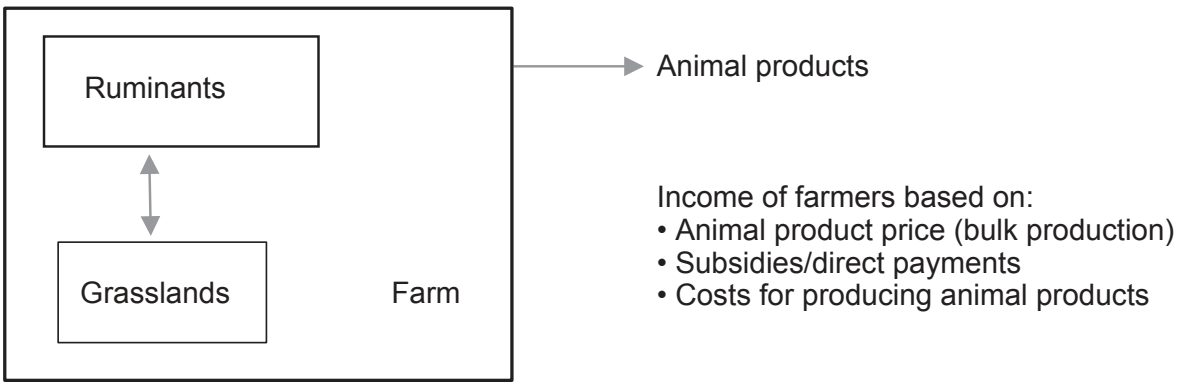
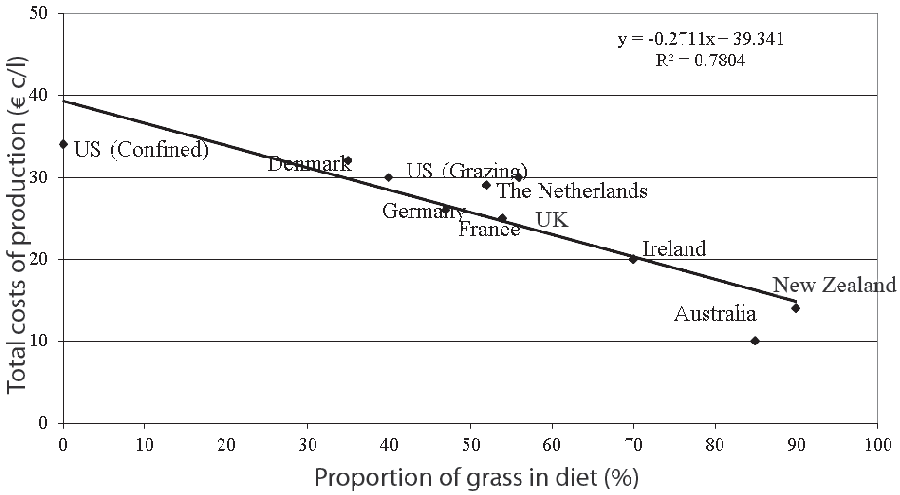


Figure 1. Grass based ruminant production in the 'old' business model; the income of farmers is based on animal products and subsidies / direct payments.



or latitude reduce the yield potential of grassland. Both constraints result in the end in an increase in the production costs of forage (Peratoner *et al*., 2017). Comparing the energy requirements of the livestock and the energy available in grassland forage production of two valleys of South Tyrol – a mountainous region of the Alps in north eastern Italy, an energy deficit of 46 and 47% was estimated (Tasser *et al*., 2012).

Examples from Germany and Galicia show that the economic effect of grass based ruminant production may be restricted as the actual grass intake is relatively low:

- Botana and Flores (personal communication, 2017) showed that on average only 15% of dry matter of the total ration of lactating dairy cows came from grazed herbage.
- A first residual analysis of federal statistical data (Statistisches Bundesamt, 2014) from lower Saxony, an important milk-region in Germany, showed that only 30% of the milk produced in this region is based on grass, grass silage and hay. The vast majority of the milk is produced with concentrates and maize (Ortgies, 2014). These results are in line with an analysis of 54 German dairy farms, where cows from all-year housing and exercise pasture farms got more than 70% of their energy from maize and concentrates and farms that provided at least 0.08 ha pasture per cow got only 50% of their energy from maize and concentrates (Becker *et al*., 2016).

So there is a tendency that, even though grass based systems are seen as low cost systems, ruminant production systems are intensifying leading to more concentrates and maize in the rations of the cows, less grass in the ration and less grazing. Furthermore, the assumed economic benefits of grass based systems are not achievable in practice in some European areas due to farm and pedoclimatic conditions or are perceived as impossible by farmers. They chose to be less grass based and transform part of their grasslands to more profitable systems. This led, for example, to grasslands in France that have been transformed into wheat and grasslands in Galicia that have been transformed into *Eucalyptus* plantations. The old business model with the underlying assumption that grass based ruminant production is profitable and will automatically be the preferred system in Europe, does therefore no longer fully work to maintain grasslands. Consequently, the question arising is whether or not this is bad and if we need a new business model or not? To answer this question, we need to look beyond the farm level and study the impact of grass based ruminant production systems for society.

New perspective: multiple benefits of grass based ruminant production systems to society

Grass based ruminant production systems provide a number of services to society (Plantureux *et al*., 2016). The Millennium Ecosystem Assessment report (MEA, 2005) distinguished four groups of ecosystem services and grass based ruminant production contributes to all of these groups:

- provisioning services: products obtained from ecosystems, e.g. production of food;
- regulating services: benefits obtained from the regulation of ecosystem processes, e.g. control of climate and disease (grasslands contribute e.g. via C sequestration);
- cultural services: non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences, e.g. recreation and beauty of the landscape (grasslands contribute e.g. via their impact on the landscape / scenery);
- supporting services: ecosystem services that are necessary for the production of all other ecosystem services, e.g. nutrient cycles.

The ecosystem services that grasslands provide are more and more recognised by society. They are highly valued by all relevant stakeholders. A questionnaire among stakeholders (farmers, government, research, advice, education, industry, NGO's) in several European countries studying the importance of different functions of grasslands showed that some functions are especially appreciated by stakeholders. The top four were (Van den Pol-van Dasselaar *et al*., 2014):

- grazing animals;
- animal production;
- biodiversity;
- beauty of the landscape.

The stakeholders especially value what they see when they are in the countryside: beauty of the landscape and biodiversity, both in different plant species and in ruminants that browse these species.

In Germany, it was shown that outdoor systems with grazing animals are perceived by consumers as more animal and environmentally friendly and even more traditional than housed systems (Weinrich *et al*., 2014). Grazing is, however, not the only option with respect to grasslands that is valued by consumers. In this regard, it must be considered that topographical (i.e. steep terrain) and climatic constraints (i.e. short growing season at high altitudes), such as in the case of the Alps, may pose strong limitations to the possibility of grazing. In these areas, management by mowing (meadows) also represents a traditional grassland use that is appreciated.

Next to the positive image that grass based ruminant production delivers to society, there are also a number of ecosystem services delivered that are less visible, but vital to the whole society, like the previously mentioned C sequestration (e.g. Soussana *et al*., 2010; Conant *et al*., 2017). Also, grazing may have a positive effect on animal welfare, e.g. Burow *et al.* (2013) found that many daily grazing hours were more beneficial on dairy cow welfare than few daily grazing hours, and Armbrecht *et al.* (2018) found that pasture access had positive effects for claw diseases that are related to moist environments.

Exposure to certain types of agricultural landscapes, especially grasslands, could also have an important role on human health and well-being. For example, when it comes to natural amenities, access to green spaces is thought to be especially beneficial to children as children in rural areas display long term health benefits from playing outdoors (Makri and Stilianakis, 2008). There are also human health benefits to be derived from consuming products from animals raised on grass. In particular, milk from pasture-fed cows (grass or clover) has significantly higher concentrations of healthy fatty acids (Elgersma, 2015). These

differences are reflected in butter produced from pasture-fed cows being superior in appearance, flavour and colour as confirmed by sensory panel data. Pasture-derived butter is also nutritionally superior for heart health with lower atherogenecity scores and containing significantly higher concentrations of CLA (c9t11), a healthy fatty acid and β-carotene which gives the butter a lovely golden colour (O'Callaghan *et al*., 2016).

All these benefits are lost when grassland is transformed into other land uses and ruminants are reared in other production systems. The decrease in the European grassland area then corresponds to a decrease in the provision of ecosystem services. In this way, the loss of grasslands and grass based ruminant production counteracts the societal good. The multiple benefits of grasslands and grass based ruminant production also offer new perspectives. As a result of rising awareness about these benefits, several societal initiatives have been developed to counteract the trend of loss of grasslands.

Societal initiatives to stimulate grass based ruminant production

European citizens react more and more to changes in their rural area. Several societal initiatives have been developed to stimulate grass based ruminant production:

- treaties (formal agreements between stakeholders);
- premiums (prizes, bonuses, or awards given as inducements);
- market concepts / differentiation of products (constructs to promote products).

These societal initiatives are illustrated by a few examples. The Netherlands provide a good example of the first two categories (treaties and premiums). In politics and society, there is a broad interest to promote farmers, whose cows have access to pasture. The visibility of ruminants, especially dairy cows, has decreased in the last decades. In the year 2001, about 90% of the Dutch dairy cows grazed on pasture, while in 2016 this percentage had decreased to 65% (CBS, 2017). Grazing has now become a real societal issue. The grazing dairy cow is seen as part of the cultural heritage of the Netherlands, and the Dutch society has expressed its concern about less grazing. As a consequence, a 'Treaty on Grazing' was initiated by a number of organisations in the full dairy chain to reverse this trend. By now, this Treaty, which aims to stabilise the percentage of farms that practise grazing, has been signed by approximately 80 organisations, including farmer organisations, industry (e.g. feed and milk robot industry), education, NGO's, government and research. As part of the Treaty, many stimulating initiatives took place. The most prominent one was the introduction of a grazing premium that is provided by the dairy industry to farmers that practise grazing for at least 120 days per year for at least six hours per day. Grazing became an issue even in parliament in 2017 when a number of political parties suggested the requirement to make grazing obligatory. Other parties were confident that the 'Treaty on Grazing' would prevent a further decrease in grazing and, as such, the Treaty prevented the obligation. At the end of 2017, it was shown that the percentage of dairy farms with grazing is increasing, which is seen as a success for the Treaty (Duurzame Zuivelketen, 2017).

The example of the Dutch 'Treaty on Grazing' with a large number of participants from different backgrounds has been followed in other countries. For example, since 2016 there is also a German 'Grazing Charta' (Deutsche Weidecharta GmbH, 2017). Recently, German dairies started to promote pasture-milk and a pasture-milk label was developed. Milk classified with this label comes from cows which graze on pasture for at least 120 days per year for at least six hours per day. Additionally, the farms must provide at least 0.2 ha grassland per cow; 0.1 ha of this grassland must be pasture for dairy cows. The farmers must provide an overview of their farm structure, the area which is supposed to be for dairy cows must not be used for heifers, calves or other animals. Actually, the farmers get 1 cent more per kg pasture milk, but this amount is expected to rise to 5 cents (Reuter and Frieler, 2017; Rohmann, 2017). The establishment of the German label was difficult, because the dairy farmers, including the grazing

farmers, were sceptical about the program. They feared that the program would lead to a strong market differentiation coming with a discrimination of all-year housing farms (Kühl *et al*., 2016).

The Netherlands and Germany are not the only countries with societal concerns about the trends towards less grasslands and less animals grazing on these grasslands. In several countries, like Spain, France and Belgium, premiums are paid to farmers in certain regions that practise grazing and / or maintain grasslands. The institutions that pay for these premiums can be very different, from consumers to industry to government. In Switzerland, for example, the government provides premiums to farmers that deliver certain ecosystem services. This is on a voluntary basis, each farmer can decide whether or not to comply with the program. In Portugal, a Carbon Fund was established, paying farmers for delivering the ecosystem service C sequestration (Teixeira *et al*., 2015).

Another category of societal initiatives are the initiatives that relate to the quality of the animal products produced and the associated market concepts. Grass based ruminant products, especially if they are grazing based and / or of regional origin, are currently positively perceived by consumers (Bernués *et al*., 2015) and qualitative aspects can be associated with them depending on the management practices applied (Coppa *et al*., 2017). A differentiation of such products is necessary to ensure recognisability if a market premium is to be secured, as well as an acknowledgement and acceptance by public opinion in case public supporting measures are implemented in disadvantaged areas. Both authentication (the process verifying the characteristics of the product as complying with its description) and traceability (the ability to follow the movement of the product from the production site to the consumers) are relevant issues to this aim (Moloney *et al*., 2014).

In conclusion, in many European countries, grass based animal products and / or ecosystem services associated with grasslands are promoted by introducing premiums and / or marketing of differentiated products. Local products are promoted as authentic and marketed as such leading to premium prices for farmers.

The farmer as a focal point: the importance of the mind-set of the farmer

When developing stimulating initiatives with respect to grasslands and grass based ruminant production, the mind-set of the farmer should be taken into account, since it is the farmer that decides on the future of grasslands. The mind-set of the farmer is important since it is known from on-farm participatory research and analysis of basic motivational drivers of European farmers, that personal values, preferences, experiences and habits of farmers are very important in management decisions (e.g. Reijs *et al*., 2013; Baur *et al*., 2016). When farmers and their families should be encouraged to change their system, the mind-set of the farmers must be considered. This is illustrated by some examples, which show that the mind-set of the farmer is an important influencing factor for management decisions in grass based ruminant production systems.

- A Swiss focus group analysing motivation and attitudes of farmers practicing either intensive indoor feeding (IF) or full-time grazing (FG) showed distinctive mind-set differences between the two groups concerning feeding strategies, economy and ecology (Baur *et al*., 2010). The IF group was found to react to the increasing market pressure by means of an increase of milk production, to seek a reduction in their dependency on seasonal variation, to increase their planning capability and to perceive itself as a modern, market-oriented enterprise. The FG group put environmental sustainability, costs minimisation and considerations on common welfare in the foreground. Interestingly, it was shown that animal welfare was equally important for the two groups, although adequately fulfilling animal requirements through concentrates was the main concern of the IF group and the positive aspects of grazing on animal welfare were the main motivation of the FG group.

- Research from the Netherlands aimed to study the technical and social factors that affect the extent of grazing on commercial dairy farms (Van den Pol-van Dasselaar *et al*., 2016) using the Theory of Planned Behaviour (Ajzen, 1991). The Theory of Planned Behaviour assumes that behaviour is affected by attitude, subjective norms, perceived behavioural control and technical possibilities. It was hypothesised that the extent of grazing is influenced by the attitude of farmers towards grazing, subjective norms about grazing, perceived behavioural control of grazing and technical possibilities for grazing. An on-line questionnaire was sent to commercial dairy farmers in the Netherlands and 212 valid responses were obtained. Results were analysed using factor analysis and multiple linear regression analysis. Including only technical factors in a model explaining the extent of grazing did not yield good results. However, combining the technical and social factors in the multiple linear regression model could account for 47% of the variation in the extent of grazing. The results imply that future work on grazing should take the mind-set of the farmer into account.
- For many farmers, an important obstacle to increase grazing is their focus on a high milk yield (Thomet *et al*., 2011). Again, an effect of mind-set of the farmer can be found. A survey among Danish farmers showed that non-grazing farmers expected grazing to reduce their milk yield but the farmers from organic farms which offer their cows access to pasture did not associate grazing with a reduced milk yield (Kristensen *et al*., 2010). A similar result was found in Germany, where the cows from north-west German grazing farms had less milk than the average of milk cows in this region, but the grazing farmers did not associate grazing with a reduced milk yield (Becker *et al*., 2016). Also, Winsten *et al*. (2000) found that grazing farmers were twice as likely to increase their reliance on grazing as non-grazing farmers.

Surveys, such as the ones used in these examples, are a common method to get more information on the decision processes of dairy farmers. But the information gathered with surveys needs a critical evaluation, especially with respect to the human tendency to avoid cognitive dissonance. When confronted with an advice which implies another behaviour or management, farmers experience cognitive dissonance (Kristensen and Jakobsen, 2011). Cognitive dissonance centres around the idea that if a person knows various things that are not psychologically consistent with one another, he will, in a variety of ways, try to make them more consistent (Festinger, 1962). Cognitive dissonance can be reduced by a change of opinion, a change of behaviour or a change of perception. When a decision is made, people tend to perceive the positive aspects of their choice stronger than before, while they mainly see the negative aspects of the rejected alternative (Festinger, 1962).

A further general flaw of studies about farmers is the assumption that farmers strive to maximise profit (the old business model, Figure 1). However, they might be motivated by many other aspects, e.g. animal welfare or the recognition of other farmers (Kristensen and Jakobsen, 2011). Baur *et al*. (2016) found European farmers to be more conservative and less open to change then the general population but also identified a tendency of farmers to be less motivated by self-interest (self-enhancement) and more concerned with common welfare (self-transcendence). Though most farms are family businesses, data about technology choices on farms is routinely collected from only one person, usually a man. It remains unclear which role the decisions about farm technology play in an overall household strategy, since many studies on farms lack the data on farm women. A study among American farmers found that farm households, where technology choice is a joint decision of man and woman, were more likely to adopt intensive rotational grazing, which was at that time and place a relatively new alternative to confinement milk production. This was also more prevalent among older couples. The role of the influence of children and parents on farm decisions needs further investigation (Zepeda and Castillo, 1997).

Finally, there is often a gap between the planned intentions of farmers and actual behaviour. In general, humans tend to be too optimistic in their intentions. An example of this is provided by Hennessy *et al*.

(2016), who asked farmers about their future production levels and compared this with actual levels three years later. A large majority of the farmers tended to be too optimistic, i.e. they overestimated their future production levels.

The importance of the mind-set of the farmers implies that farmer education is very important. Farmer education is an ongoing process promoted at several levels by multiple actors. Thematically broad education is delivered from professional schools for agriculture up to the universities. As education grades are provided at specific points in time of the professional life of farmers, other ongoing training and knowledge transfer activities are needed about specific themes and can best be guaranteed by a network of extension services and innovation brokering systems interacting with the aforementioned educational and research institutions. Education provides farmers knowledge, analytical tools and technical skills that allow them to be more independent in their judgement, such as in the case of advertising and consultancy made by commercial companies. Indeed, the students of today are the farmers and farm advisors of the future, and as such, they determine the future of grass based ruminant production.

Farm economy, the new business model

Grass based ruminant production systems provide a number of relevant and highly appreciated services (Plantureux *et al*., 2016). These services provide multiple benefits to society. It is the farmer, however, that needs to maintain these benefits by maintaining the grasslands. In the past, additional services were not specifically rewarded by society. In recent years, however, a number of societal initiatives has been started to support the farmer in maintaining grasslands and grass based ruminant production systems. This has led to a new business model where farmers are rewarded either for animal production or for societal demands or for both (Figure 3).

The new business model leads to opportunities to realise the multiple benefits of grass based ruminant production systems throughout Europe. In some areas, e.g. countries with a good climate and high productivity grasslands like Ireland, grass based ruminant production will remain an economically viable activity in itself and additional rewards for ecosystem services may further increase profitability. In other areas, societal initiatives to stimulate grass based ruminant production will be necessary to maintain grasslands, e.g. premiums for delivering ecosystem services, marketing of local products, etc. The latest communication on the future of the Common Agricultural Policy also stresses the importance of supporting the public goods produced by farmers. These initiatives should be supported by innovative research and advice. Innovations in grassland management are continuously needed and are currently stimulated and promoted in regional, national and European projects. As such, they support sustainable development of grass based production systems. The European project Inno4Grass is a clear example of

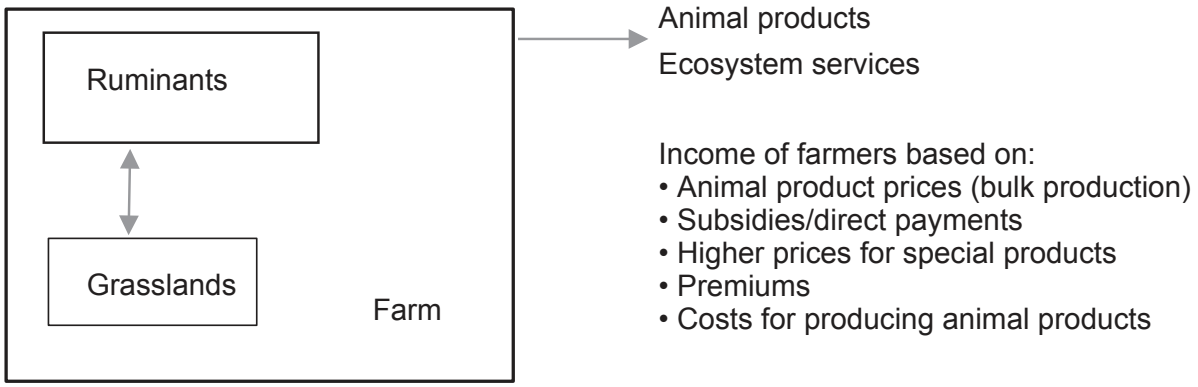


Figure 3. Grass based ruminant production in the 'new' business model; the income of farmers is based on animal products, subsidies / direct payments and rewards for additional ecosystem services.

such a project (www.inno4grass.eu). It aims to bridge the gap between practice and science communities to ensure the implementation of innovative systems on productive grasslands and to increase the profitability of European grassland farms and preserve environmental values.

Conclusion

Grass based ruminant production provides multiple benefits to farmers and to the whole of society. Supporting the continued multiple benefits of grass based production systems to society requires new business models, where farmers are rewarded for added value. Farmers are key actors when it comes to maintaining and improving grass based production systems since they decide on the day-to-day management of the farm. When promoting systems like grass based ruminant production systems, the mind-set of the farmer should play a crucial role, since it is clear from research and practice that the mind-set of the farmer is very important for day-to-day decisions about grassland management. Farmers are influenced by the human tendency to avoid cognitive dissonance, so behaviour usually changes when opinions or perceptions change. It is also clear that the often mentioned assumption that farmers strive to maximise profit is not so simple. Farmers are motivated by many other aspects, like animal welfare and the recognition of other farmers and society. To maintain grass based ruminant production, it is necessary to clearly show the importance of this production system for society to the farmers (customer perspective) and support this by valuing the products from these systems accordingly. We believe that it is the combination of these two (showing the importance and valuing this) that will shape the future and will lead to the sustainable development of grass based ruminant production. Of course this should be accompanied by clear communication. Special attention should be paid to the young farmers, since they represent the next generation of farming.

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