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Ecosystem services and production systems of family cattle farms: an analysis of animal production in Pampa Biome

Serviços ecossistêmicos e o sistema de produção de pecuaristas familiares: uma análise da produção animal no Bioma Pampa

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Highlights:
The maintenance of animal production is considered valid by the producers of the Association.
Production of beef cattle on natural grassland provides the ecosystem service of provision.
Cultural services are one of the highlights of the producers.

Abstract

This paper aims at discussing the beef cattle production system, related to ecosystem services, to emphasize the case of *Associação de Produtores do Rincão do Vinte e Oito* (Association of Rincão do Vinte e Oito Producers). The main objective is to analyze the offer of ecosystem services in the Ibirapuitã Environmental Protection Area (EPA), regarding the beef cattle production and sheep farming in the natural grassland. A case study with nine producers of the Association, considered as an analysis unit, was conducted in 2017 through semi-structured interviews. According to the producers, the preservation of animal production was valid, as they believed that it can provide welfare for their families and the remaining population. The respondents mentioned that, in the past, the tradition of producing beef cattle and sheep was very strong in the region, but nowadays, besides the tradition, they produce for profit, to be able to remain in rural areas. Beef cattle through the ecosystem supply service providers food for the population through meat production and sheep farming through meat and wool. Although the main theme of the research is directly related to the provisioning services, mainly focusing on beef cattle in the natural grassland, the cultural ecosystem services were widely cited during the research. The interviewers strongly highlighted the preservation of the traditional activities, conducted since the early days of occupation of the territory of Rio Grande do Sul, as well as the issues related to the preservation of the environment in which they live, the solidarity between the producers, and the natural grassland maintenance. Moreover, the observed landscapes indicated that the maintenance of rural agroecosystems in the region was preserved, thus putting even more emphasis on the range of ecosystem regulatory services.
Key words: Cattle production. Environment. Payment for Environmental Services.

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Resumo

Este artigo visa abordar o sistema de produção da bovinocultura de corte, relacionado aos serviços ecossistêmicos, de modo a dar ênfase ao caso da Associação de Produtores do Rincão do Vinte e Oito. O principal objetivo é analisar a oferta de serviços ecossistêmicos na Área de Proteção Ambiental (APA) do Ibirapuitã, relacionados à bovinocultura de corte e a ovinocultura em campo nativo. Como unidade de análise, foi realizado um estudo de caso com nove produtores da Associação, através de entrevistas semiestruturadas, no ano de 2017. A manutenção da produção animal é considerada válida segundo os produtores, pois acreditam que pode proporcionar o bem-estar para as suas famílias e para o restante da população. Os entrevistados mencionam que antigamente a tradição de produzir bovinos de corte e ovinos era muito forte na região, mas que, atualmente, além da tradição, produzem por conta do lucro, para conseguirem se manter no meio rural. A pecuária de corte por meio do serviço ecossistêmico de provisão fornece alimento para a população através da produção de carne e a ovinocultura através da carne e lã. Apesar da principal temática da pesquisa ser diretamente relacionada com os serviços de provisão, principalmente com enfoque na bovinocultura de corte em campo nativo, durante a realização da pesquisa, os serviços ecossistêmicos culturais foram amplamente citados. A manutenção das atividades tradicionais, realizadas desde os primórdios da ocupação do território gaúcho, as questões voltadas à preservação do meio em que vivem, a solidariedade entre os produtores e a manutenção dos campos foram muito destacadas pelos entrevistados. Além disso, pôde-se constatar a partir da observação das paisagens, que a manutenção dos agroecossistemas rurais da região estão preservados, proporcionando, assim, ainda mais ênfase na gama de serviços ecossistêmicos de regulação.

Palavras-chave: Bovinocultura. Meio ambiente. Pagamento por Serviços Ambientais.

Introduction

The many transformations occurring in ecosystems, mostly related to human action, and the search for strategies devised for producing in an environmentally sustainable and economically viable manner, are becoming increasingly complex (Vargas & Silveira, 2018). Although there are new technologies capable of increasing large-scale production at lower costs, as well as reduced labor use, many family farmers have their production systems unchanged, which in many cases results in low productivity and low financial return.

In this respect, this study aims at approaching the beef cattle production system, particularly related to the environmental aspects of the activity related to ecosystem services, linked to the benefits that the society can obtain from ecosystems. Thus, the emphasis is on the case of the Association of Rincão do Vinte e Oito Producers, which deals primarily with calf production system.

In the Ibirapuitã Environmental Protection Area (EPA) territory, located in the Pampa Biome, comprising the municipalities of Alegrete, Quaraí, Santana do Livramento, and Rosário do Sul (Southwestern Region of Rio Grande do Sul), the use of the natural grassland for animal production is widespread, with predominating extensive cattle and sheep farming, which allows better preservation of biodiversity. However, farmers often find it difficult to keep animals on natural land throughout the year, due to the low supply of forage in colder seasons and prolonged summer drought, ultimately reducing the profitability of the activity (Silveira, Velho, Vargas, Genro & Velho, 2006; Silveira, Vargas, Oliveira, Gomes & Motta, 2005).

In case of beef cattle and sheep farming, there are some difficulties regarding animal management in natural grassland with natural pastures, such as the low forage supply in some periods, mainly due to the environmental changes that occur in the natural grassland, caused by anthropic action. Even so, the activities are environmentally sustainable when compared to other productive activities, as they exhibit lower greenhouse gas emissions and environmental degradation. In addition, as observed

by Fidelis, Appezzato-da-Glória and Pfadenhauer (2009), natural grasslands are an important carbon reserve mechanism.

Despite some socioeconomic and environmental particularities, such as advancing soybean cultivation and the invasion of Annoni grass (*Eragrostis plana*), which are affecting the production systems of beef and sheep farming, producers remaining with animal production without converting their production systems into other crops have enabled biodiversity preservation. This is because, insofar, as they maintain their production systems, they do not increase the level of interference with local ecosystems. This possibility exists because, with extensive livestock in the native pasture, one of the main systems adopted by producers in the region, changes in natural pasture are minimal, as animal breeding in these areas allows the maintenance of native vegetation characteristics.

This situation, evidenced among the producers in the Ibirapuitã EPA region, refers to a relatively new, little-explored theme, gaining increasing space in Brazilian academic research focused on sustainability and environmental preservation subjects. This is environmental valuation, which can be understood as the ability to attribute economic values to environmental services (Andrade, 2010).

Environmental valuation is directly related to ecosystem services, and those, consequently, as linked to the benefits the society can obtain from the ecosystems. According to Andrade and Romeiro (2009a), services generated by the ecosystems are necessary for the economic activity functioning, for individual life quality and human society cohesion. Therefore, the study of how the generation of these ecosystem services occurs, and which are their possible interactions with human variables, becomes relevant, mainly because of the possibility of gaining a better knowledge of the occurrence of some anthropogenic phenomena. One example of these phenomena is how economic and population growth can affect the ability of these ecosystems to deliver services that are essential to individuals.

Therefore, although livestock is a traditional activity in the Pampa biome, considering the actual scenario in which the activity is inserted, there is a great challenge regarding the preservation of this biome and cattle production using its natural resources. Economic viability and conservation of biomes via implementing management practices appropriate for the environment as well as animals need to be compatible in the production systems. The high price of grain also puts pressure on areas of animal production, shifting the use of these lands to agricultural production, with faster and more intense effects on the Pampa biome's biodiversity (Nicoloso, Silveira, Coelho & Quadros, 2018; Silveira, González & Fonseca, 2017).

This concern, with the possible benefits that the society can achieve through the maintenance of ecosystem services, led to the development--in the south region of Rio Grande do Sul, specifically in the area covered by the Ibirapuitã EPA, between 2009 and 2012--of the Project "*Aglomerados Urbanos em* Áreas *Protegidas: Métodos para promover o desenvolvimento sócio-econômico da população com a tutela da natureza (Urban Agglomerations in Protected Areas: Methods to promote the socio-economic development of the population under the protection of nature - (Urb-al Pampa)*," characterizing the properties and productions in activity in the region. The main objective of the project was a joint work for creating new entry sources linked to land and culture valuation, as well as the protection of natural resources (Andrade, 2012).

Based on this, the objective of this study was to analyze the supply of ecosystem services of Ibirapuitã EPA related to beef cattle and sheep in the natural grassland. In addition, this study aims to interpret and describe the supply of ecosystem services, based on the study of the activities conducted on properties and on the knowledge of producers belonging to the Association of Rincão do Vinte e Oito Producers.

Materials and Methods

This study was based on a case study from the Association of Rincão do Vinte e Oito Producers, in the municipality of Alegrete. We analyzed the ecosystem services provided by the association members, their understanding about ecosystem services, how they may contribute to their maintenance, and their perceptions regarding payment possibilities for these services in beef cattle production.

The research was conducted in January 2017, starting with a visit to Maronna[4] Foundation, Alegrete, to define the producers to be interviewed. After this, the selected producers being the pioneers in creating the association, the data collection occurred in Rincão do Vinte e Oito, in the hinterland of Alegrete, through semi-structured interviews applied to all producers belonging to the Association, thus characterizing the population in statistical terms. One of the producers, even interviewed, was not considered in the results and discussion, as his characteristics did not represent the reality of the research; this producer lived in the city and used the property only on weekends. Thus, nine producers were considered for data analysis.

Descriptive statistics was used and the number of "Yes" answers in the questionnaire was measured; that is, a quantitative observation of the number of regulatory services was conducted. However, subsequently, each item was qualitatively and separately evaluated. The criteria choice and use in each ecosystem's service type were made by adopting Peixoto's (2011) model, inserting characteristics related to animal production and predefined environmental management practices.

The choice of properties was based on the distance from Maronna Foundation headquarters, located in Rincão do Vinte e Oito, starting with the nearest properties. The interviews were recorded and later transcribed. The reason for the recording and later transcription is that the main speeches of the producers can be withdrawn for the elaboration of a formal text. Producers were identified by numbers (Producer 1, Producer 2, following the sequence - Figure 1) to ensure the anonymity of respondents.

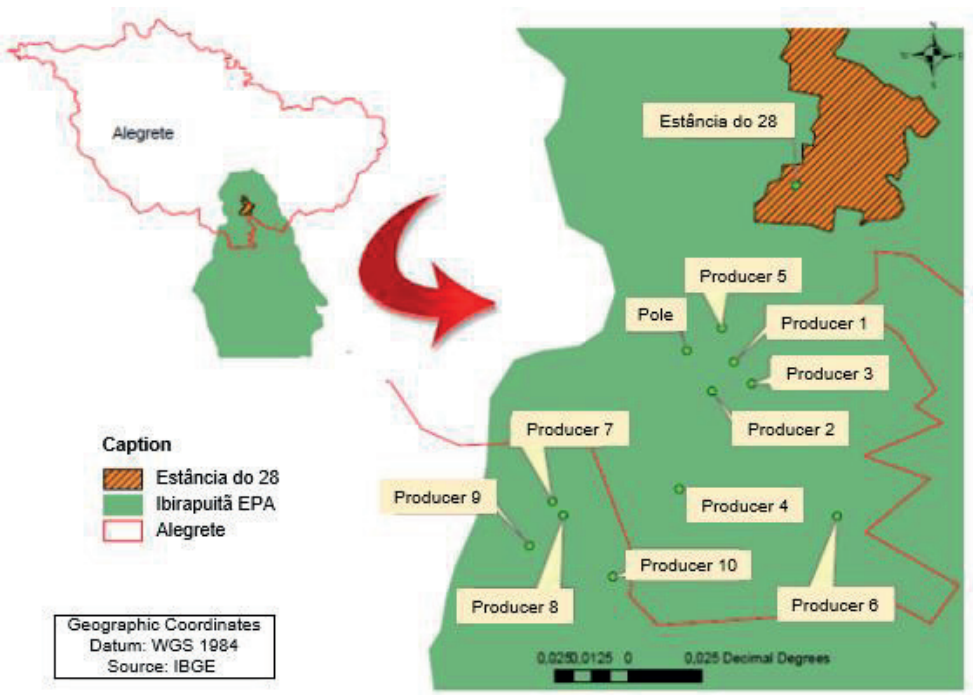

Figure 1. Map of Rincão do Vinte e Oito.

[4] Public entity under private law without economic purposes, with rural establishments that are the basis of financial support and guarantee the viability of the entity's activities. The Foundation is located within the Ibirapuitã EPA.

Families were present during the interviews, and in some cases, producers' wives who often participated in production activities. The speeches of these women were also considered when preparing the text. Additionally, during the days of interviews in the Community, it was possible to participate in one of the Association's monthly meetings, which helped to better understand the producers' activities and organization.

The semi-structured interview script had a special focus on the ecosystem service valuation. Minayo (2012) conducted a semi-structured interview, stating that it offers to the respondent the possibility of talking about the subject under discussion, without being restricted to the questions addressed by the researcher. The author also highlighted that the fieldwork allows a better proximity of the researcher with reality, besides establishing an interviewer-interviewed interaction, enabling empiric knowledge construction (Minayo, 2012).

Regarding the case study also used in the paper, Gil (2010) described that some steps to be followed can be defined as follows: a) formulation of the problem or research questions, b) definition of case units, c) case selection, d) elaboration of the protocol, e) data collection, f) analysis and interpretation of data, and g) writing of the report. In this study, the steps suggested by Gil (2010) were followed, as will be explained below.

The reason for studying the case of the Association producers remains on the possibility of interpreting and describing the environmental services provided by the Ibirapuitã EPA rural producers, from the identification of the activities conducted inside the property. With this in mind, we analyzed the dynamics of environmental preservation occurring in the region, the possibilities for producers to enter Payment for Environmental Services projects, and the alternatives for other properties, with the same productive and socioeconomic characteristics.

The central analysis was based on the provision services, mainly by the primary activity that producers developed through animal production, which directly influenced the other two categories of ecosystem services: regulatory services and cultural services. The definition of ecosystem services used in this research is that established by the *Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services* (Intergovernmental Plataform on Biodiversity & Economic Services [IPBES], 2015), which classifies the services as 1) provision services that can be understood as food, water, wood, and fiber; 2) regulatory services that affect climate, such as floods, disease, waste, and water quality; and 3) cultural services, focused on providing recreational, aesthetic, and spiritual benefits (Díaz et al., 2015).

Results and Discussion

The questions regarding the environmental aspects of the properties related to the producers' knowledge about agricultural production, productive activities capable of more or less polluting the environment, the history of livestock production in the region, and the interviewees' understanding about ecosystem services.

The cattle breeders were asked if they were aware that the property is within an EPA, and all stated that they knew and understood the need to preserve it. Regarding the possibility of interference in the management of property agricultural production, because they are in an EPA, almost all (88%) answered that, even if the property was not inserted in an EPA, it would produce similarly, as shown by Producer 3's statement:

It does not interfere. In our current view, it does not interfere. With the changes, with the load adjustment, nothing changes. We have to build a mindset to change people's way of life. To change this, people have to be persistent (Producer 3).

In agreement with this comment, Producer 4 stated, "still the same thing. No one would do what he (she) should not, even if it was not an

EPA." Adding the importance of livestock for environmental preservation, Producer 10 said, "If there was no cattle breeding, the EPA would be degraded. Agriculture would have degraded the area."

From the producers' speech, we can notice that some factors have contributed to the degradation and loss of the southern grassland in recent years. One of them is the price of agricultural products, especially soybeans, where in favorable weather years, many farmers make a switch from their production systems to agriculture. Moreover, the fragility of the cattle chain and the lack of successors and government incentives end up in depriving the countryside characteristics (Silveira et al., 2017; Vélez-Martin, Chomenko, Madeira & Pillar, 2015a). In the APA region in the municipality of Alegrete, the landscapes, in general, still do not present this type of disfigurement described by the authors. In addition, during the interviews, the producers indicated that the lands are not suitable for this use, but are suitable for the practice of cattle raising in the natural grassland, due the countryside characterization and the region relief.

When comparing agriculture to livestock, medium-term agricultural profits are equivalent to beef cattle profit, because of their heavy dependence on external inputs and productivity fluctuations due to climate. Moreover, agriculture has high environmental and social costs, and due to these aspects, the production of high-quality meat may be the best alternative for rural producers, especially for the environmental gain it may offer (Vélez-Martin et al., 2015a). The sustainability of agricultural systems often depends on interrelated factors such as activity intensification levels, resource use and management, location, and productive orientation of the producer. These factors differ between production systems (Ripoll-Bosch et al., 2012).

It is possible to notice, from producers' speeches, the consciousness that they may produce in a way that does not harm the environment, that they are within an EPA, and even if they were not, they would still produce in the same way, with minimal interventions in the natural environment. This is clear in their speeches.

With respect to production, cattle farmers were asked if they would stop producing any crop to protect the environment, and all answered yes. Some answers included the following: "yes, I would. The environment belongs to everyone" (Producer 1); "yes. There are always alternatives and possibilities to produce without touching areas that cannot be degraded" (Producer 3); and "I never had the idea of producing grain or other crops, because the land here is not for this type of planting" (Producer 5).

Aiming at understanding producers' view of productive activities with greatest potential to pollute the environment, we obtained the following answers: "What pollutes the most is the grain production, due to the high amount of pesticides. I believe it pollute" (Producer 4). Another producer quoted, "I think soy. Nevertheless, there are hardly any in the region, due to the condition" (Producer 2). One of them emphasizes animal production: "cattle are said to produce a lot of CO_2, but if you protect the environment, take care of pasture quality, it compensates for the emissions from the animals" (Producer 3). Care with EPA was also mentioned: "this is an EPA. We protect the soil, we perform the throwing sowing" (Producer 7).

Vélez-Martin et al. (2015b) agreed that, when many producers decide to move from cattle breeding to agriculture, the landscape changes radically. However, many landowners notice that, besides being a highly adapted activity to the Pampa Biome region, cattle breeding assures better climate stability and has less price fluctuation compared to agriculture.

Complementing the producers' comments on environmental degradation, in accordance with Nabinger, Ferreira, Freiras, Carvalho & Sant'Anna (2009), the cattle breeding production in the natural grassland, considering a pastoral natural ecosystem,

is the best sustainable use option of resources for food production. This is true mainly in areas where the soil use offers restrictions to the utilization of more intensive agricultural systems. Note that the Pampa Biome displays good resilience capacity, which makes its maintenance mandatory, as an environment and landscape preservation means, as well as social and economic sustainability.

Producers believe that the cattle breeding production is rooted in the region history, as the extensive animal production occurs in almost 90% of the productive land. This becomes evident when Producer 4 says, "cattle breeding is historical, mostly due to the region relief. There is no arable area in the region. There must have been a maximum of 10% arable area, and keeping the roots is very good."

Regarding regional culture, it is clear that for almost four centuries, pastoral activities have been practiced, marking the history, customs, and identity of the inhabitants in the region (Vélez-Martin et al., 2015a).

The authors further emphasize the importance of livestock practice in the following sentence: "the elimination of natural grassland represents the disconnection with the natural basis that underlies this entire intangible heritage" (Vélez-Martin et al., 2015a).

With respect to the possible depletion of natural resources, Goodland (1992) indicated that this fact occurs beyond tolerable levels, and the rational and systematic use of these resources must be taken into account to extend the use of nature by future generations.

Fernandez (2008) corroborated the idea that with increasing population, numerous environmental difficulties come up against this fact, generating, as an effect, even greater problems for societies, such as deforestation, destruction of areas, high levels of waste, environmental degradation, pollution, and frequent climate change. These problems enlarge the new needs, related to the environment, as environmental preservation has become highly widespread among all individuals. However, care is not always enough to reduce damage or stabilize the situation.

The possibilities of maintaining the landscape, pastures, culture, and animal production as a livelihood and maintenance of families, in the natural grassland beef cattle breeding, are still an aspect to be considered, especially for the environmental preservation that the activity is generated (Food and Agriculture Organization of the United Nations [FAO], 2016).

The respondents (88%) also mentioned that, in the past, the tradition of beef cattle and sheep production was very strong in the region. Nowadays, besides the tradition, they produce for profit, to be able to stay in the rural environment, as it can be observed in the following statement:

> "We live here for 30 years. It was a sacrificed life in the past. At that time, there was nothing left. My wife believed that working outside the property in the town would be better, because there was no return from our activity. I received 88 hectares from my father, and leased the rest. I had to get everything out of here, feed the animals, pay the rent, and support myself." (Producer 6)

Producer 6's wife, who also attended the interview, said that, when the activity was not profitable, she wished to leave the property and move to the city. However, the productive activity organization and control of production expenses enabled them to restructure and achieve better gains, especially after the association establishment. In addition, the producer, who actively participated in productive activities with her husband, argued that, with regard to social participation, the possibility of interacting with others in meetings and celebrations made her change her mind about leaving the property.

The answers related to profits from cattle breeding were distinct, depending on the properties and cattle squad size. Producers owning lesser land and fewer animals (44%), mainly those counting on their retirement, reinforce that the profit was not satisfactory. Producer 2 commented on this matter: "it happens three times a year only; however, other activities would not succeed, because this is all for the region. I currently only have the calves to sell in the market, but they are few."

According to Ribeiro and Quadros (2015), most producers in Rio Grande do Sul exhibited a traditional cattle breeder profile, with no major advances in technology and commercial relations, exerting the activity due to tradition (26%), security (14%), and profit (8%) reasons. The authors, based on their studies, believed that cattle breeding was driven from decision-making processes, considering some points such as security, stability, tradition, and personal satisfaction, and not fundamentally profit (Ribeiro & Quadros, 2015).

However, Producer 1, who owned more land and more animals, claimed, "in this region, there is no higher profit. I do not think there is an "engine" bigger than this one." In addition, Producer 3 shared his viewpoint:

> I have always heard of crop diversification. If one is not successful, another will be. There is no such thing in livestock. There are two different lines, either diversification or specialization. You have to be a professional in what you produce. You are a calf producer; you have to specialize. Agriculture and livestock areas in this region are difficult. The right thing would be for you to become a professional in your activity. Livestock is slow but safe. Low investment and high security. There is more insecurity in agriculture; it requires high expenses to produce (Producer 3).

This interview agreed with the thought of Producer 6, when he says,

> The important thing is to focus on something and become a specialist. As we have little labor, there is no way to change to another activity, an activity you do not know. Changing activities is not on our mind. We always produced cattle. I will do what I know (Producer 6).

Still talking about producing a different culture or migrating into another activity, Producer 4 stated, "I do not have this intention and I think I should not do this. If you are looking for another alternative, this means that what you are doing is not working out. Meat is necessity, and so is wool." This producer was talking about sheeps, mentioning wool production, also sold, even on a smaller scale.

Producers also argued about PES. Have they heard about this?

Only one of the respondents answered he had, and commented, "it is a low carbon agriculture right?" (Producer 3). Their opinion about the possibility of receiving financial aid to preserve the environment was discussed during the interviews, and there were many answers:

> Yes, I could receive aid in animal production. It is one of the things that should be profitable, because it encourages us to prevent environment degradation (Producer 1).

> It depends, I could even consider it. These government funds. Once there was money to buy sheep, from the government (Producer 2).

> I do not think so. It is people's duty, their obligation to protect the environment; after all, they live in that environment (Producer 3).

> It would be interesting to have something with zero interest in the developed activities (Producer 5).

Respondents commented that they preserve the environment through animal production. This is clear from the following responses: "We try to do things in the best way we can. Handle poison with care. Do not burn the grassland" (Producer 7). In his turn, Producer 1 added, "We preserve with animal production. But it depends on how we produce." Producer 6 added, "In a natural grassland I believe it preserves, without letting the animals shave the grassland."

In livestock production, more precisely regarding the current concerns about its global impacts, players prioritize economic, social, and some environmental factors related to sustainability (Ripoll-Bosch et al., 2012). For Gianezini, Alves, Techemayer & Revillion (2012), concerns with the environment, as well as with the welfare of farm animals, include the promotion of greater control over the environmental impacts of the entire production chain.

Pillar, Andrade and Dadalt (2015) indicated that there are numerous ecosystem services provided by the natural grassland, such as water regulation, clean water supply, livestock fodder production, and recreation potential. In addition, the authors explained that,

> [...] grazing herbivorous animals such as cattle harvest the fodder and use it to stay alive and grow, excreting urine and feces that feed many decomposing animals, including invertebrates and soil microorganisms. Fungi and bacteria help make nutrients in organic matter available to plants. (Pillar et al., 2015, p.117).

Table 1[5] shows the regulatory services according to the answers of the interviewed member. Six out of twenty questions about the regulatory services received 100% "Yes" responses. They included the following: 4) Provides a correct destination for agrochemical and veterinarian product packages; 8) Keeps the animals in natural grassland (cattle and sheep); 10) Preserves the EPA; 12) There is no farming on the property; 16) Keeps cattle and sheep raised together; and 20) does not burn the soil.

Table 1
Regulatory services according to respondents' response

REGULATORY SERVICES	Yes	No	N. A.
1. Promotes microclimates, to reduce the variation in the mean temperature. Example: shade for animals, woods, trees (animal welfare).	2	0	7
2. Plants trees, for wind breaking, slowing the wind down, or preventing wind tunnels from forming.	2	3	4
3. Installs some type of structure to reduce soil erosion and flooding	2	3	4
4. Provides correct destination for agrochemicals and veterinarian product packages.	9	0	0
5. Establishes green or reforestation areas.	1	6	2
6. Implements vegetation cover that contributes to improving water quality	2	5	2
7. Installs apiaries (bee box) that contribute to the increase in pollinating insect populations.	0	9	0
8. Keeps the animals in natural grassland (cattle and sheep)	9	0	0
9. Controls animal diseases through alternative sources Example: medicinal plants	0	9	0
10. Preserves EPA	9	0	0
11. Has legal reserve area on property	2	7	0

continue

[5] Adapted from Peixoto (2011).

continuation

12. Has no crop on the property	9	0	0
13. Keeps riparian forest (around river) on property	6	1	2
14. Does not utilize stored pasture (hay/silage) for cattle and sheeps	8	1	0
15. Perceives the presence of native honeybees/red paper wasp	0	9	0
16. Raises cattle and sheep together	9	0	0
17. Adopts agricultural systems that favor the increase in organic matter deposit on the soil. Example: organic fertilization	1	8	0
18. Uses little or no chemical fertilizer on the soil	8	1	0
19. Performs rotary grazing/Voisin grazing	0	9	0
20. Does not burn the soil	9	0	0

Caption N.A.: not applicable.

Pillar et al. (2015) reported that there are immediate and direct benefits in the natural grassland. As an example, they mentioned the use of natural vegetation as the fodder source, a highly economically important activity, providing a diversified diet to the animals, producing high-quality meat, particularly if compared to confined animals.

Regarding item 4, the packages' destination by producers was the return to agricultural stores in the city. In items 8, 10, 16, and 20, producers have a relevant understanding on EPA preservation and environmental importance in beef cattle and sheep production in the natural grassland, as well as avoiding the technique of burning the soil. About tillage (item 12), some producers had small planted areas (especially maize) for their own consumption or animal feed.

Other questionnaire items had varied answers. In item 1) (If it promotes microclimates, to reduce the variation in the mean temperature), most producers (78%) said that this factor does not apply to the region, as there are many trees in the grassland areas for the animals to protect themselves from intense heat. The others answered that they perform some type of management to reduce the temperature variation, including tree planting.

In items 2 and 3, which concern the planting of trees with windbreak function and structures to reduce soil erosion and flood occurrence, respectively, the responses were quite varied. Producers who said they perform this type of management were 22%, those who said they did not do it were 33%, and those who said it does not apply to properties, as there is no need, were 45% of the total. In addition, regarding green areas or reforestation (item 5), 67% of producers said they do not implement this type of crop, as they do not realize that it can improve the family's life quality or income.

Items 11 and 13 refer to the legal reserve and riparian forest, respectively. Seventy eight percent of the respondents do not yet have a legal reserve area on the property, but intend to legalize. With regard to riparian forest, 67% already have forest area, when there is a river on the property. For 22% of the respondents, this question does not apply, as they do not have streams or rivers within their property borders. Another item that resembles the questions related to the preservation of the property areas is number 6, in which the interviewees were asked about the implantation of vegetation that may contribute to improvement in water quality. Fifty five percent of the respondents said they do not perform this type of management; the others had answers divided into "Yes, they do some kind of vegetation cover, and the rest, which does not apply to the property."

Two questions had 89% of "Yes" answers and 12% of "No" answers. They included the following:

14) Does not use preserved pastures (hay and silage) for cattle and sheep and 18) Uses little or no chemical fertilizer in the soil. The producers mentioned that, in these items, that they do not use hay and silage because they do not think it is necessary, since the animals remain in the natural grassland all the time. Concerning the chemical fertilizer, respondents (77%) mentioned that, when necessary, some areas of the natural fertilized grassland are improved by fertilization, but on a small scale. In addition, in relation to soil, in item 17, about 90% of producers mentioned that they do not adopt systems that can favor an increase in organic matter in the soil, as is the case of organic fertilization, a factor that can be considered important when adopted in systems of extensive production in the natural grassland.

Four questions had 100% "No" responses. They include the following: 7) Install apiaries (bee box) that contribute to an increase in pollinating insect populations; 9) Controls animal diseases through alternative sources; 15) Perceives the presence of native honeybees/red paper wasp; and 19) Performs rotary grazing/Voisin grazing. These issues are also present in other production systems, as expected in the research, and the results confirmed that in the livestock systems of Rincão do Vinte e Oito natural-grassland producers, issues such as alternative production (honey) and management (pasture deferral) are not implemented by the producers.

Table 2 presents the provision services provided by the family cattle breeders in Rincão do Vinte e Oito. Around 35% of the 14 mentioned items had 100% affirmative answers. This is because the studied producers are family farmers, and in general, they already offer various provision services to the society.

Table 2
Provision services according to respondents' response

PROVISION SERVICES	Yes	No	N. A.
21. Promotes the increase in farming and livestock productivity	9	0	0
22. Enables the decrease in cultivated areas (crop)	9	0	0
23. Enables deforestation decrease	9	0	0
24. Solar energy conversion actions	0	9	0
25. Works with sheep production (wool)	9	0	0
26. Works with sheep production (meat)	9	0	0
27. Works with beef cattle production (meat)	9	0	0
28. Works with dairy cattle production	8	1	0
29. Works with poultry production	8	1	0
30. Works with pig production	0	9	0
31. Preserves water sources	8	0	1
32. Works with afforestation	0	9	0
33. Uses animal traction	1	8	0
34. Do not use tractor/harvester or other machines	4	5	0

Caption N.A.: not applicable.

The productive activities of ranchers, in which the producers highlighted that they can promote an increase in agricultural productivity (item 21), either by producing beef cattle and sheep (items 26 and 27) or wool (item 25), came from the items with 100% of "Yes" answers.

Animals raised in heterogeneous grassland, such as the natural grassland, have the ability to take better advantage of food diversity, which is not the case with animals raised in cultivated pastures (Vélez-Martin et al., 2015b). An analysis of the global situation of ecosystem services shows that 60% of them are degraded, and that, in the provisioning services, beef cattle has an increase in production per area unit, but without exceeding sustainable levels of utilization and environmental degradation (Millennium Ecosystem Assessment [MEA], 2005).

Item 22, indicating a decrease in cultivated areas, discloses that 100% of producers meet the requirement. Their major focus is animal production, and they do not plan to have crop areas, because they believe that the land is inadequate for this purpose and are not interested in changing their activity, either by tradition in animal production or by the profitability of the activity. In addition, as they keep the animals in the natural grassland, the cattle breeders state that they reduce the deforestation (item 23) in 100% of properties.

The cattle breeders, as shown in Table 3, indicated all cultural services, at least once.

Table 3
Cultural services according to respondents' response

CULTURAL SERVICES	Yes	No	N. A.
35. Has there been no landscape change in recent years?	2	7	0
36. Contributes to regional identification	9	0	0
37. Contributes to the issuing regional identity protection stamps. Example: calves	9	0	0
38. Contributes to the evolution of knowledge through insertion in research. Example: Urb-al Project.	9	0	0
39. Contributes to the promotion of learning through educational programs. Example: help in community school.	1	8	0
40. Participates in religious activities	5	4	0
41. Participates in associations	9	0	0
42. Participates in (gaucho traditional group) GTC	5	4	0
43. Believes that rural tourism can develop the region	7	2	0
44. Likes where he/she lives, because of the special landscape	9	0	0

Caption N.A.: not applicable.

The cultural services in the community, according to the response of all interviewees, included the following: contribution to regional identification, contribution to the issuing of regional identity protection stamps, and contribution to the evolution of knowledge through insertion in research, participation in associations, and appreciation for the place where they live, for the possibility of living in a place with a different landscape (36, 37, 38, 41, and 44). These points with a unanimous response are centered on the various studies in the region in question, either by the creation of the Association of Rincão do Vinte e Oito Producers or by the inclusion of residents in research and projects, such as the Urb-al Pampa Project, and other studies in partnership with universities and producers.

One of the producers mentioned very emphatically an extension project carried out by the Federal University of Santa Maria (UFSM) "*Actions aiming at the sustainable development of*

Rincão do Vinte e Oito, Alegrete - RS," which dealt with operationalizing actions in the Rincão region and is part of the UFSM covenant and Maronna Foundation. The main objective was to enable the development of the region of Rincão do Vinte e Oito and surroundings, in social and economic aspects, in a sustainable manner, to improve life quality of the community. The main methodology of the project was based on producers' effective participation in meetings, grassland days, and technical activities, defining action priorities in the community. The main results were the organization of the Association of Rincão do Vinte e Oito Producers, the adoption by producers of techniques adapted to their production systems, the technical qualification of producers for the productive organization, and obtaining socioeconomic indicators from studies on the properties.

A. F. C. Vargas and Silveira (2010) believed the producers' participation in this project and their possibility of interfering in decision-making on the actions taken, makes the process legitimate, and the intermediary role, performed by the Maronna Foundation, allows in obtaining better results through actions developed by other institutions participating in the project, working toward regional sustainable development.

Andrade and Romeiro (2009b) discussed that cultural services can also include cultural diversity, because the diversification of ecosystems themselves influences culture; formal or traditional knowledge generation; religious, educational, and aesthetic values; and human behavior. However, the transformation of ecosystems into landscapes with homogeneous and cultivated characteristics is associated with economic and social changes, especially due to rapid urbanization in general, weakening the diversity and cultural identity of individuals. In contrast, with the population increase, greater availability of leisure time and increased purchasing power, recreation, and tourism are potentially increasing, giving space to eco-tourism actions, and thus, ecosystem conservation (Andrade & Romeiro, 2009b).

When asked about the recent landscape modification (item 35), we identified that the term "landscape modification" is not always considered pejorative; that is, the modification of the landscape mentioned by the producers was positive, since they currently see a higher number of trees on the properties, for example.

Andrade (2010, p. 56) described the importance of the ecosystem services, especially the cultural ones:

> Simply resting in the shade of a tree or enjoying a beautiful landscape makes one unknowingly enjoy the services offered by ecosystems. As they are often imperceptible and not incorporated into conventional economic transactions, anthropic actions have been affecting the delicate balance of ecosystems, compromising their ability to generate useful benefits for humans.

Participation in educational programs (item 39) is small because only one of the families, having school-age children, participates in educational activities linked to the community school. In the religious activities and participation in Gaucho Tradition Centers (GTCs), the answers were different. Producers (44%) living in more remote locations within the community mentioned the difficulties of moving to participate in such activities, especially on rainy days, when roads are in poor condition.

Producers also believe that they have a pleasant place to live and develop their productive activities with the necessary welfare. We can see this in the interview with Producer 5's wife, when she says, "a friend told me: what do you want in this end of the world? We are here, but we already have our system. Every Sunday we meet with the neighbors in the shed. We always have something to do. He said we do not see people here, but we do see people."

Regarding rural tourism, producers stressed that it could develop the region, but could not describe how, once again mentioning the precariousness of the roads and the distance between the community and the city. Ecological tourism, as cited by Andrade and Romeiro (2015), when referring to cultural services, corresponds to an important source of income in countries that still have a large part of conserved ecosystems.

Pillar et al. (2015) stated, when mentioning cultural benefits, that the grassland areas offer opportunities for tourism exploitation, whether for the scenic beauty, bird watching, or even the possibility of experiencing a different environment with rural characteristics.

Conclusions

Livestock in the natural grassland, rooted in the regional production history, prevails on the Alegrete properties, as Rincão do Vinte e Oito producers settled in the countryside for a long time perceive this activity as a regional tradition. This tradition has gained strength recently, after the consolidation of the producers' association, enabling the organization of the productive activity based on the specialization and improvement of beef cattle production with a focus on calf production, generating an income improvement for rural families.

Regarding ecosystem services, within the provision services, the most present were the animal production systems, widely practiced in the region, mainly beef cattle and sheep farming in the natural grassland, being responsible for a large part of the income in the countryside.

Still within the scope of ecosystem services, note that producers do not have a clear understanding on how the maintenance of livestock production systems can generate benefits, although it was evident from the research that several regulatory, provisioning, and cultural services are present in production systems.

Producers think that maintaining livestock production is valid because they believe they can provide welfare for their families and the remaining population. In addition, regarding the ecosystem services provided by beef cattle and sheep farming in the natural grassland, it is understood that the activity allows the maintenance of the Pampa Biome grassland, where the tradition for animal production does not allow grain monocultures to gain space.

Although the main theme of the study relates directly to the provision services, mainly focusing on beef cattle breeding in the natural grassland, cultural ecosystem services were widely cited during the research. The maintenance of traditional activities, carried out since the beginning of the gaucho territory occupation; the issues related to the preservation of the environment in which they live; the solidarity between the producers; and the maintenance of the grassland were highlighted by the interviewees.

In addition, it can be seen, when observing the landscapes, that the maintenance of rural agroecosystems in the region is preserved, putting even more emphasis on the range of regulatory and cultural ecosystem services provided by rural residents in general.

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