Different Household Livelihood Strategies and Influencing Factors in the Inner Mongolian Grassland

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Abstract: Household livelihood strategies affect grassland ecosystem services and the herder’s well-being. Understanding different household livelihood strategies and influencing factors is crucial for sustainable development in pastoral areas. We surveyed 241 households in the typical grassland region of Inner Mongolia to classify the different types of household livelihood strategies using income-based cluster analysis and to identify the major influencing factors of household livelihood strategies with partial least squares structural equation modeling (PLS-SEM). Our study has several findings. First, according to household income sources, there are five types of household livelihood strategies in this region, including breeding only small livestock (S), breeding mainly small livestock (SL), breeding mainly large livestock (LS), breeding only large livestock (L), and not breeding livestock (N), with the S strategy as the most dominant household livelihood strategy in this region. Second, among the five types of household livelihood strategies, the LS strategy had the highest household income (323,200 Chinese yuans) while the N strategy had the lowest household income (68,540 Chinese yuans). Third, among the five types of livelihood capitals, manufactured capital and natural capital had more substantial influences on household livelihood strategies. Manufactured capital directly influenced household livelihood strategies, while natural capital affected household livelihood strategies either directly or indirectly through manufactured capital. Our results suggest that the LS strategy would be the most economically profitable among the five household livelihood strategies in the typical grassland region of Inner Mongolia.

Keywords: household livelihood strategies; cluster analysis; PLS-SEM; Xilinhot; livelihood capitals

1. Introduction

A household is commonly considered to be the basic decision-making unit involving production and consumption [1,2]. Household livelihood strategies are usually defined as the capabilities, assets (including both material and social resources), and activities required for a means of living [3,4]. A household can adjust its household livelihood strategy according to market changes and demands to satisfy the needs of society and to enhance their competitiveness. However, when a herder household chooses different household livelihood strategies, it may have a substantial impact on the conditions of grasslands, affecting the grassland ecosystem services [5–7] and the herder’s well-being [8,9], which
may further influence the sustainable development of a pastoral region [10]. Thus, identifying and comparing household livelihood strategies can help policy interventions to promote the sustainability of pastoral regions [11,12].

Households attempt to sustain their livelihoods with diverse strategies and activities. Household livelihood strategy has often been broadly defined as a mix of various activities [13]. When classifying households into different household livelihood strategies, a series of factors that can separate these strategies need to be identified. Cluster analysis based on either the household’s assets and activities pursued to make a living or the income sources from different sources is one of the most commonly used approaches [14–16]. The income-based method has long been advocated due to its simplicity in quantitative analysis and explanation [11,17,18].

Household livelihood strategy is influenced by many factors, such as the household land area [17], education level of the household head [19,20], and the number of tractors of the household [1]. For example, the household land area showed a significant positive impact on households in the highlands of Tigray, Northern Ethiopia, in choosing crop production as a major strategy [17]. The education level of the household head showed a significant positive impact for households in rural areas of central Nepal in choosing a nonfarm wage strategy against diversified subsistence [20]. To analyze the influencing factors of household livelihood strategies, these variables were summarized into five types of livelihood capital, including natural capital, human capital, manufactured capital, social capital, and financial capital. This is according to the Sustainable Livelihood Analysis Framework which was proposed to explore whether poor people’s livelihood is sustainable or not [11,21,22].

The Inner Mongolia grassland, which is located in the Inner Mongolia Autonomous Region of China, is a dominant component of Eurasian grassland, accounting for 67% of the total area [23,24]. It plays an important role in providing vital ecosystem services for the whole region, the whole country, and even the whole world. The Xilingol League in Inner Mongolia is one of the main animal husbandry bases of China [25]. Xilinhot City is the location of the local government of the Xilingol League, which is surrounded by vast grasslands. In the early 1980s, the Chinese government implemented a new land use policy which gives herder households the right to use and manage the grassland to deal with the grassland degradation problems, while the state still owns the grassland. As a result, the herder household became the basic unit for decision making in pastoral activities in this region. This policy led to a completely sedentary management style and increased grassland fragmentation [26,27]. Zhang et al. [28] studied different household livelihood strategies in a typical grassland area of Inner Mongolia. Their work focused primarily on the ecological effects of different household livelihood strategies without exploring the influencing factors of household livelihood strategies.

The objectives of this study were to identify the major household livelihood strategies and their influencing factors in the typical grassland region of Inner Mongolia, so as to provide science-based suggestions for pastoral sustainability in this region. Specifically, we address the following two questions: (i) What are the different types of household livelihood strategies in the typical grassland region of Inner Mongolia? (ii) What are the major influencing factors of household livelihood strategies in this region? The answers to these two questions would provide useful information for policymakers and practitioners in designing effective programs for regional sustainable development and grassland conservation in the typical grassland region of Inner Mongolia.

2. Study Site

This study was conducted in the pastoral area within the administrative boundary of Xilinhot City (Figure 1), which is located in the central part of the typical grassland in Inner Mongolia. The study area was selected because it has long been used as grazing land by herdsmen for thousands of years, and because its economy is based largely on animal husbandry [27]. The jurisdiction of Xilinhot City stretches from latitudes 43°02′ N to 44°52′ N and longitudes 115°13′ E to 117°06′ E with a total area of 14,780 km$^2$ [25,29,30]. It has a population of 267,000, with Han as the majority (67%), Mongolian as the main minority (28%), and others making up the rest [28]. The study area lies within the temperate
semi-arid region which has a mean annual precipitation of 295 mm and a mean annual temperature of \(-0.1\) °C. The topography of the study area is high in the south and low in the north, with an average altitude of 988.5 m above sea level. This region is mainly composed of high plains and hills, dominated by natural grasslands (13,780 km\(^2\) of typical steppe).

![Figure 1. Locational maps of the study area and household sites.](image)

3. Methods

3.1. Data Collection

Using questionnaires, we followed a two-step procedure method for data collection described by Hardeweg et al. [31]. Counties were used as the basic sampling unit. Xilinhot City is comprised of 11 county-level units, including the downtown area, two farms, and eight ranches. The eight ranches with grazing activities were selected for this study: Chaokewula Ranch, Baoligen Ranch, Bayanbaolage Ranch, A’ershanbaolage Ranch, Baiyinxile Ranch, Baiyinkulun Ranch, Maodeng Ranch, and Beilike Ranch. Then, about 30 households were randomly drawn from each selected ranch. Altogether, 241 households were surveyed (Figure 1).

The questionnaire was structured in four sections. The first section requested personal information on the household heads (e.g., age, gender, ethnicity, and education). The second section focused on the basic information about the grassland, including the inherited grassland, leasehold grassland, and the total available grassland, which is the sum of the inherited and leasehold. In the third section, incomes from various sources (e.g., small livestock sales, large livestock sales, grass sales, tourism, government subsidies, grassland rentals, and wages) were assessed. The last section collected information on basic material requirements, including the living infrastructure and the animal husbandry infrastructure. The geospatial position and altitude of each household were recorded by GPS.

The data collection was conducted during 18 days in September 2017 by four investigators who were grouped into two teams. All investigators were trained by the team leader before the investigation in order to ensure each question in the questionnaire was asked in the same way. Each face-to-face interview was conducted using the questionnaire, with an average time of half an hour. At the end of
each day, the team leader examined the questionnaires for possible errors. If there was a problem, a telephone call or another visit to the interviewed household was conducted.

3.2. Data Analysis

3.2.1. Classifying Households Based on Their Livelihood Strategies

Different household livelihood strategies were classified with the income-based cluster analysis. In the first step, seven income sources (i.e., small livestock sales, large livestock sales, grass sales, tourism, government subsidies, grassland rentals, and wages) were included in the Principal Component Analysis (PCA) to identify the major factors. In the second step, a cluster analysis of the major factors related to household livelihood strategies was conducted to classify 241 households.

One-way ANOVA was used to compare the basic characteristics of livelihood capitals for different household livelihood strategies. Based on data availability, we chose 23 variables to represent five types of livelihood capitals (Table 1) [32]. Natural capital generally refers to the natural resources that can provide valuable ecosystem goods and services to human society [33], including both traditional resources (e.g., water and energy) and natural assets that are not easily valued monetarily (e.g., biodiversity) [34]. In our study region, households did not always have full control over natural capital and only had the right to use it [35]. Human capital usually refers to the health, well-being, and productive potential of humans, including their mental and physical health, education, and work skills. The number of people in a household can reflect the productive potential of humans to some extent [14]. Besides, our study region is a multi-ethnic gathering region, with Han as the majority and Mongolian as the main minority. People of different ethnic backgrounds may lead to enhanced and diverse work skills and household livelihood strategies. As a result, the ethnicity of the household head is also an indicator of human capital [35]. Manufactured capital refers to the produced assets that can be used to produce other goods and services. Social capital consists of networks of relationships and trust, which enable efficient societal functions. In our study, the number of mobile phones is used as an indicator to represent social capital because mobile phones allow the members to keep in touch with friends, relatives, and partners, which can reflect the connections and networks of a household [36]. Financial capital refers to monetary economic resources that can be used to purchase what are needed for production and services. The meaning of livelihood capitals was summarized in Table 1.

All the analyses were performed with the Canoco 5.0 [37].

Table 1. Livelihood Capital Types and Specific Variables.

| Livelihood Capital | Variables | Meaning | Scale | Literature |
|--------------------|-----------|---------|-------|------------|
| Natural capital    | Inherited | Household’s inherited grassland area | Metric, in mu | [17,38] |
|                    | Leasehold | Household’s leasehold grassland area | Metric, in mu | [17,38] |
|                    | Available | Household’s total available grassland area | Metric, in mu | [1,39] |
|                    | ALT       | Altitude | Metric, in m | [11,14] |
|                    | MAP       | Mean annual precipitation | Metric, in mm | |
|                    | MAT       | Mean annual temperature | Metric, in °C | |
|                    | Admin     | Administrative | Qualitative, number 1 to 8 represent different counties | |
| Human capital      | hhsize    | Number of people in household | Metric, in persons | [39,40] |
|                    | hhlabor   | Number of household member older than 16 and younger than 60 years old | Metric, in laborers | [41,42] |
|                    | hgage     | Age of household head | Metric, in years | [14,17] |
|                    | hhgender  | Gender of household head | Qualitative, male = 1, female = 2 | [43] |
|                    | hhethnic  | Ethnicity of household head | Qualitative, Han = 1, Mongolian = 2 | [44] |
|                    | hhedu     | Education level of household head | technical secondary school = 4, high school = 5, college = 6 | [19] |
3.2.2. Income Differences and Its Influencing Factors

One-way ANOVA was used to explore the differences in the household’s mean annual total income (the sum of seven income sources) between all the sampled households (i.e., the whole sample) and five types of household livelihood strategies. Both Pearson’s correlation analysis and stepwise multiple linear regression were used to identify the influencing factors of their mean annual total incomes. All the analyses were performed with SPSS 20.0 (IBM SPSS, Chicago, IL, USA).

3.2.3. Identifying the Influencing Factors of Household Livelihood Strategies

In this study, structural equation modeling was used to analyze the influencing factors of household livelihood strategies [47–49]. There are two main methods of structural equation modeling in practical application: the covariance-based structural equation model (CB-SEM) and the partial least squares structural equation model (PLS-SEM) [50]. CB-SEM solves the covariance structure of the variables by the maximum likelihood estimation, while PLS-SEM is based on the partial least squares. The advantages of choosing PLS-SEM instead of CB-SEM in this study are as follows. Firstly, PLS-SEM does not require normally distributed data [51]. Secondly, the amount of sample data is more flexible [52]. Finally, PLS-SEM is more suitable for exploring purposes and verifying causal relationships when the relevant theories are not sufficient [53].

A typical PLS-SEM is composed of two parts: the structural model and measurement model. In this study, we conducted a structural model based on the relationships between five types of livelihood capitals and household livelihood strategies in previous studies. In the structural model, we hypothesized that five types of livelihood capitals would directly influence household livelihood strategies, human capital would indirectly influence household livelihood strategies by affecting natural capital, manufactured capital, and social capital, and natural capital would also indirectly influence household livelihood strategies by affecting manufactured capital [20,22,32]. In the measurement model, five types of livelihood capitals were represented by 23 capital variables shown in Table 1, and household livelihood strategies were represented by the incomes of small livestock sales, large livestock sales, and other sources, including grass sales, tourism, government subsidies, grassland rentals, and wages.

While the model fit of PLS-SEM usually is not emphasized, the global goodness of fit index (GOF) is often used to verify whether the model adequately explains the empirical data. The GOF values range from 0 to 1, where 0.10 is considered small, 0.25 is medium, and 0.36 is large (satisfying the global validation) [51]. The GOF value of our study is 0.31, which is considered sufficiently large.

All the analyses were performed by “plspm”, which is an R package for performing PLS-SEM analysis, with R version 3.5.1 (http://cran.r-project.org/).

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Table 1. Cont.

| Livelihood Capital Variables | Meaning                                      | Scale                  | Literature |
|------------------------------|----------------------------------------------|------------------------|------------|
| Manufactured capital         |                                              |                        |            |
| Shed                         | The area of breeding sheds                    | Metric, in m²          |            |
| Well                         | The number of wells                           | Metric                 |            |
| Pump                         | The number of pumps                           | Metric                 |            |
| Tricycle                     | The number of tricycles                       | Metric                 |            |
| Tractor                      | The number of tractors                        | Metric                 | [45]       |
| Motorbike                    | The number of motorbikes                      | Metric                 | [13]       |
| Fence                        | The length of fences                          | Metric, in m           |            |
| Livestock                    | The number of livestock units owned by household | Metric, in sheep units | [46]       |
| Social capital               |                                              |                        |            |
| Mobile                       | The number of mobile phones                   | Metric                 | [36]       |
| Financial capital            |                                              |                        |            |
| Loan                         | Household’s total loan amount                 | Metric, in Chinese yuan | [35]       |
4. Results

4.1. Classification of Household Livelihood Strategies

According to income-based cluster analysis, there are five types of household livelihood strategies in the typical grassland region of Inner Mongolia (Figure 2). The first cluster (63.49% of all households) included the households that bred only small livestock (e.g., goats, sheep) (S). Both the second cluster and the third cluster included households that bred a mix of small and large livestock (e.g., cattle, cows, horses). The second cluster (21.99% of all households) included households that bred mainly small livestock (SL), and the third cluster (7.05% of all households) included households that bred mainly large livestock (LS). The fourth cluster (4.15% of all households) included households that bred only large livestock (L). The fifth cluster (3.32% of all households) included households that did not breed livestock (N). The households of the fifth cluster lived on grass sales, tourism, government subsidies, grassland rentals, or wages. The most dominant household livelihood strategy in this region was the S strategy.

![Figure 2. The results of PCA ordination. Household income sources included small livestock sales, large livestock sales, grass sales, tourism, government subsidies, grassland rentals, and wages.](image)

Basic characteristics of livelihood capitals for different household livelihood strategies were summarized in Table 2. The results of one-way ANOVA revealed that livelihood capitals were significantly different among the five types of household livelihood strategies (Table 2). For example, compared with households that chose other household livelihood strategies, households of the LS strategy had significantly different natural capital and manufactured capital. As for natural capital, they owned less inherited grassland and leased more. However, the area of their total available grassland was still significantly smaller than the others. MAP for households that chose the LS strategy was greater than the others. Meanwhile, they had substantially more manufactured capital. The area of breeding sheds, the number of tricycles, the number of tractors, the number of motorbikes, and the number of livestock were all significantly larger than the others.
Table 2. Basic characteristics of livelihood capitals for different household livelihood strategies.

| Livelihood Capitals | S          | SL         | LS          | L           | N          | Average |
|---------------------|------------|------------|-------------|-------------|------------|---------|
| Natural capital     |            |            |             |             |            |         |
| Inherited           | 3082.25a   | 4117.64b   | 1939.71a    | 2090.00a    | 2758.75ab  | 3177.45 |
| Leasehold           | 1552.68a   | 1797.74ab  | 2444.12ab   | 3392.00b    | 187.50a    | 1700.46 |
| Available           | 4632.25a   | 5896.51b   | 4348.53ab   | 5302.00ab   | 2760.00a   | 4855.91 |
| ALT                 | 1088.54    | 1103.24    | 1115.51     | 1148.51     | 1079.44    | 1095.86 |
| MAP                 | 293.06a    | 298.49ab   | 305.40ab    | 308.82ab    | 305.40ab   | 296.37  |
| MAT                 | 1.80       | 1.80       | 1.79        | 1.80        | 1.80       | 1.80    |
| Admin               | 4.67a      | 4.57a      | 2.53b       | 4.70a       | 4.75a      | 4.50    |
| Human capital       |            |            |             |             |            |         |
| hhsize              | 3.45       | 3.38       | 3.24        | 3.60        | 3.50       | 3.42    |
| hhlabor             | 2.85       | 2.74       | 2.65        | 3.00        | 2.86       | 2.82    |
| hhage               | 46.74a     | 48.35ab    | 49.10ab     | 49.10ab     | 52.88b     | 47.34   |
| hhgender            | 1.17a      | 1.06b      | 1.10ab      | 1.25ab      | 1.15       |         |
| hhethnic            | 1.50a      | 1.53a      | 1.53a       | 1.10b       | 1.38ab     | 1.49    |
| hhedu               | 2.86       | 2.87       | 2.94        | 3.10        | 3.00       | 2.88    |
| Manufactured capital|            |            |             |             |            |         |
| Shed                | 164.77a    | 217.70bc   | 276.76b     | 136.00acd   | 15.00d     | 178.14  |
| Well                | 0.99       | 0.91       | 1.12        | 0.80        | 0.75       | 0.97    |
| Pump                | 1.25       | 0.89       | 1.06        | 0.90        | 0.75       | 1.13    |
| Tricycle            | 0.67a      | 0.75a      | 0.94b       | 1.00b       | 0.13c      | 0.70    |
| Tractor             | 0.87ab     | 1.02a      | 1.06ab      | 0.90ab      | 0.50b      | 0.90    |
| Motorbike           | 1.24a      | 1.43bc     | 1.76bc      | 1.40ac      | 0.63d      | 1.30    |
| Fence               | 8448.37    | 9783.10    | 11488.24    | 8300.00     | 3250.00    | 8874.79 |
| Livestock           | 399.90a    | 556.35b    | 604.88b     | 403.65a     | 13.44c     | 436.09  |
| Social capital      |            |            |             |             |            |         |
| Mobile              | 2.67       | 2.87       | 2.82        | 2.90        | 3.25       | 2.76    |
| Financial capital   |            |            |             |             |            |         |
| Loan                | 5.33       | 6.15       | 5.06        | 9.00        | 5.25       | 5.64    |

The superscript letters indicate categories that are significantly different at the 5% significance level.

4.2. Income Differences and Its Influencing Factors

The mean annual total income of all the sampled households was 140,080 Chinese yuan. Compared with different household livelihood strategy clusters, the SL strategy, the LS strategy, and the L strategy were higher than, whereas the S strategy and the N strategy were lower than the grand mean annual income. Of all the five strategies, the LS strategy had the highest mean annual income (323,200 Chinese yuan), and the N strategy had the lowest (68,540 Chinese yuan) (Figure 3). The results of one-way ANOVA show that the LS strategy was significantly higher than the other four clusters. The N strategy was significantly lower than the SL strategy and the LS strategy (Figure 3).

In general, the results of both Pearson’s correlation and stepwise multiple linear regression were similar. As shown in Figure 4 and Table 3, the number of livestock was the most important influencing factor for all the sampled households. For individual household livelihood strategies, the number of livestock was also the most important influencing factor for the S strategy and the SL strategy, the total available grassland area was the most important influencing factor for the LS strategy, the education level of the household head was the most important influencing factor for the L strategy, and no variables were significant for the N strategy.
Figure 3. Household mean annual total income for different household livelihood strategies. The bar represents the mean and the error bar represents the SD. The letters are derived from one-way ANOVA. Letters indicate significant differences at the 5% level.

Figure 4. Pearson’s correlation coefficients between the household mean annual total income and livelihood capitals of the whole sample and five types of household livelihood strategies. Dots represent natural capital; triangles represent human capital; diamonds represent manufactured capital, and squares represent social capital. Significantly correlated variables include the number of livestock (livestock), total available grassland area (available), education level of household head (hhedu), the length of fences (fence), leasehold grassland area (leasehold), the number of wells (well), the number of pumps (pump), the area of breeding sheds (shed), inherited grassland area (inherited), the number of mobile phones (mobile), the number of motorbikes (motorbike), the number of tricycles (tricycle) and the number of tractors (tractor).
Table 3. The results of standardized regression between the household mean annual total income and livelihood capitals of the whole sample and five types of household livelihood strategies. Significant variables are the inherited grassland area (inherited), total available grassland area (available), altitude (ALT), mean annual precipitation (MAP), ethnicity of household head (hhethnic), education level of the household head (hhedu), and the number of livestock (livestock).

| Samples | Inherited | Available | ALT | MAP | Hhethnic | Hhedu | Livestock | Combined |
|---------|-----------|-----------|-----|-----|----------|-------|-----------|----------|
| Whole   | 0.128 *   | −0.299 ** | 0.436 ** |       | 0.710 ** | 0.600 (0.592) |
| S       |           | 0.696 ** |     | 0.485 (0.482) |
| SL      |           | 0.771 ** |     | 0.720 (0.709) |
| LS      | 0.930 **  |          | 0.350 * |       |          | 0.709 (0.668) |
| L       |           | 0.844 ** |     | 0.712 (0.676) |
| N       |           |          |     |      |          |        |

* Significant at the 0.05 level. ** Significant at the 0.01 level.

4.3. Influencing Factors of Household Livelihood Strategies

PLS-SEM was used to analyze the relative contribution of each livelihood capital to household livelihood strategies. Because the variables representing financial capital were not significantly correlated with three income sources, financial capital was not included in the final PLS-SEM analysis. The results show that manufactured capital (0.58) was the most important factor affecting household livelihood strategies, followed by natural capital (0.55). The influences of human capital and social capital on household livelihood strategies were rather limited (Figure 5). The PLS-SEM results (Figure 6) show that manufactured capital directly affected household livelihood strategies (0.58), while natural capital affected household livelihood strategies either directly (0.26) or indirectly (0.29) through manufactured capital.

Figure 5. Direct and indirect effects of livelihood capitals on household livelihood strategies in the typical grassland region of Inner Mongolia.
was mainly a willing or able to invest that much money. The second reason is the desire to maximize income by increasing livestock numbers. The mean annual total income of households that chose the S strategy was mainly affected by the number of livestock (Figure 4 and Table 3). By so doing, however, herders pursued the quantity of breeding livestock at the expense of the net profit. The third reason is education level. The technical and knowledge requirements for breeding large livestock are high [28]. Based on Figure 4 and Table 3, the mean annual total income of households that chose the L strategy was mainly affected by the education level of the household head. However, according to our questionnaire-based survey, most of the herders had a relatively low education level (Table 2). As a result, they were not able to master the technology to breed large livestock.

Several studies have explored the influencing factors on household livelihood strategies [20,22,35], using the livelihood approach as a conceptual framework [3]. The general conclusion was that household livelihood strategies were affected mainly by access to and control over different types of livelihood capitals. Babulo et al. [17] found that natural capital (household land area) influenced household livelihood strategies. Baffoe and Matsuda [55] found that human capital (gender of household head)
influenced household livelihood strategies. The results of our study show that manufactured capital and natural capital had a significant influence on household livelihood strategies. Previous studies also found that natural capital (e.g., the distance to the extracting ground of the environmental resources) affected household livelihood strategies in Cambodia [35], and that manufactured capital (the value of livestock assets) affected household livelihood strategies in the rural areas of central Nepal [20].

Different types of livelihood capitals are the platforms for a household to choose their household livelihood strategies [13]. Natural capital directly influenced households to choose different household livelihood strategies (Figure 6). Natural capital is the foundation based on which households obtain ecosystem goods and services [33]. Owing more grasslands means having more environmental resources, and precipitation is the most important environmental factor in the semiarid region of Inner Mongolia [58,59]. Higher MAP means higher productivity. Our study also reveals that natural capital indirectly influenced household livelihood strategies by affecting manufactured capital (Figure 6). Manufactured capital is the support for households to access environmental resources. Meanwhile, manufactured capital influenced household livelihood strategies directly (Figure 6). With the same natural capital, the households’ choices of household livelihood strategies are influenced by their manufactured capital [35].

5.2. Implications for Grassland Management and Sustainable Development

Our study suggests that the LS strategy would be the most economically profitable household livelihood strategy in the typical grassland region of Inner Mongolia because of three main reasons: (i) more efficient use of grassland resources, (ii) lower risks of natural disasters, and (iii) stronger resilience to market and political uncertainties. Small and large livestock utilize grassland resources differently. Small livestock prefer to utilize short grassland (e.g., *Leymus chinensis*, *Cleistogenes squarrosa*) while large livestock prefer to utilize tall grassland (e.g., *Stipa klemenzii*, *S. krylovii*). Thus, breeding a mix of small and large livestock can make fuller use of all kinds of grasslands [60]. Due to high variability in precipitation, productivity fluctuates greatly in this region. In a dry year, small livestock grow better, but in a wet year, large livestock grow better. Thus, breeding a mix of small and large livestock will be better in response to natural environmental variabilities. Finally, the price of small livestock and large livestock may be influenced by market fluctuations and institutional changes [61]. Changes in price may lead to economic volatilities. So, breeding a mix of small and large livestock has a stronger overall resilience to both environmental and market fluctuations.

Although economic benefits are always considered a key factor in policymaking, economic benefits should not be considered the only or the most important criterion for choosing the best household livelihood strategies from a sustainability perspective. The dimensions of society and environment should also be considered together [62]. Each household livelihood strategy should be evaluated in terms of sustainable use of environmental resources. Zhao, Zhang, and Li [49] found that household livelihood strategies with a mix of small and large livestock had the lowest carbon footprint, implying the highest ecological benefit. This suggests that the most economically profitable household livelihood strategies can also be more (if not most) environmentally friendly. Future studies need to pay more attention to how household livelihood strategies affect the relationship between grassland ecosystem services [5,47] and the herder’s well-being [8], as well as the synergies and tradeoffs between economic and environmental outcomes. In addition, while there are three types of grasslands in Inner Mongolia (i.e., typical grasslands, meadow grasslands, and desert grasslands), our study focused only on the typical grassland region. Further studies are needed for the other two types of grasslands.

The government of the Xilingol League implemented the policy of “reducing sheep and increasing cattle” in 2016. Our study seems to support this policy in general. To help implement this policy on the regional scale, governmental financial assistance is necessary [63]. Moreover, technical support for developing new kinds of livestock and breeding methods is needed. Such support can be facilitated by related governmental agencies working together to organize technical workshops and training programs for local herders [64].
6. Conclusions

This study investigated household livelihood strategies and their influencing factors in the typical grassland region of Inner Mongolia. According to household income sources, there are five types of household livelihood strategies in this region, including breeding only small livestock (S), breeding mainly small livestock (SL), breeding mainly large livestock (LS), breeding only large livestock (L), and not breeding livestock (N). The dominant household livelihood strategy in this region is the S strategy. The choices of household livelihood strategies are mainly affected by manufactured capital (e.g., the number of livestock) and natural capital (e.g., total available grassland area). Based on our study and previous research in this region, both economically profitable and environmentally friendly household livelihood strategies are not only desirable in theory, but also possible in practice. These findings have important implications for grassland management and sustainable development in this region.

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