CSCanada
Canadian Social Science
Vol. 9, No. 5, 2013, pp. 126-133
DOI:10.3968/j.css.1923669720130905.2790

ISSN 1712-8056[Print]
ISSN 1923-6697[Online]
www.cscanada.net
www.cscanada.org

Grassland Grazing Contracts and Degradation: Relationship and Mechanism

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Supported by China National Nature Science Fund (No. 71263033), and National Social Science Fund (No. 09BYL011), and Youth Foundation of Inner Mongolia University (No. ND0516).

Received 21 July 2013; accepted 3 October 2013

Abstract

Is there some relation between the degradation and grazing institution? This paper attempts to find internal mechanism among the institution, herdsman behavior and degradation. The behavior of herdsman once was analyzed in private property of grassland, although once opposed. A grazing contract model under uncertainty was built, with which the herding behavior was checked. To analyze the relationship and mechanism between contracts characteristics and grassland degradation, the relation between and different risk preferences were studied under the decentralized equilibrium of the contract through setting the different parameters to show the basic characteristics of the grazing contract. We reach the following conclusions: the risk preferences of the type of pastoral are important to grassland degradation. The fact means the party to a contract is risk-neutral and will lead to overgrazation. Grassland degradation will arise in some situation expected utility maximization, even when both parties are risk averse. The conclusion is similar Elinor Ostrom's points in 1990 that private property rights of grasslands may not the only, even not the best solution.

Key words: HRS; Herding behavior; Grassland grazing contracts; Uncertainty; Risk preferences; Grassland degradation

YING Gang, GUO Xiaochuan (2013). Grassland Grazing Contracts and Degradation: Relationship and Mechanism. *Canadian Social Science, 9*(5), 126-133. Available from: http://www.cscanada.net/index.php/css/article/view/j.css.1923669720130905.2790
DOI: http://dx.doi.org/10.3968/j.css.1923669720130905.2790.

INTRODUCTION

China's economic institution reform extended to grassland animal husbandry since 1985. The grassland reform resulted in two opposite effects: on one hand the animal product (production value and number) increased year by year, which is illustrated at Figure 1 and Figure 2; on the other hand grassland ecology deteriorated. According to *2005 Environment Condition Bulletin of China* issued by the State Environmental Protection Administration, 90% natural grassland of china was of degradation in certain degrees. Grassland degradation will not only increase the cost of grass production, but also lead to a series of environmental problems as desertification, biodiversity loss, soil degradation, soil erosion and the loss of carbon sinks.

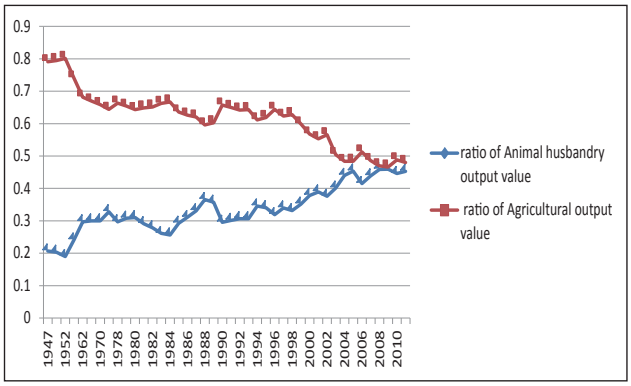

Figure 1
The Ratio of Animal Husbandry Output Value

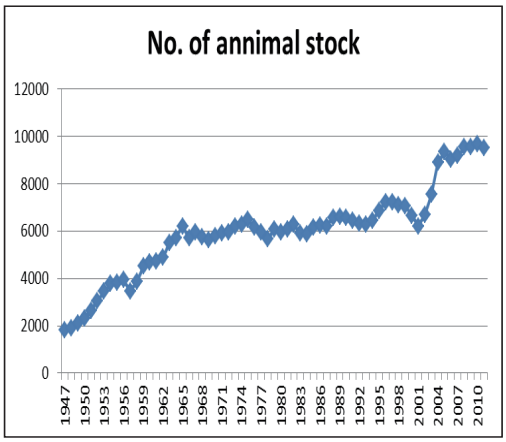

Figure 2
The Increasing of Animal Stock

In china, more and more scholars and officials have recognized the importance of institution arrangement to grassland use, however china's earlier grassland management has its focus and feature. Here we simply introduce China's grassland property right system household responsibility system (HRS) which means the 30 yearlong or longer exclusive use right of a piece of grassland is endowed to a herdsman and during the periods herdsmen can use it by himself or gain benefit from transferring the land to the others. More often once a herdsman obtains the land he will fence the grassland and if he wants to feed more animals, he can rent another piece of grassland for a short or long time but the rent periods must be below using time limit of herdsmen's endowed land. According to Eirik G. Furubotn and Svetozar Pejovich (1972) and Cheung (1968 & 1970), exclusive right to use and transferable rights for resource constitutes main characteristic of private property rights (PPR), and then china's HRS can be classified to a certain PPR.[1] While one may argue that the rights of HRS of china has terminable limitation, for our present purpose it suffices to point out that according to the HRS's rule the herdsman always can obtain another 30 yearlong or longer terminable property rights of his grassland when the land's 30 years use periods have ended, so although there is some inconvenient especially when to data of termination, the herdsmen use their grassland freely in their daily life as if it belongs to them.

Few theories have been developed to explain the relation and mechanism between grassland degradation and grazing institution change of China. The earlier theory on commons and common pool resource developed by Gordon (1954), Hardin (1968) and Oplhuls (1973) showed that pubic or open access resource might be destroyed by human being's over abuse. In case of grasslands inevitable ecologic degradation, and this line's scholars also implied that commons tragedy problems was either due to uncontrolled access or resource inalienable, so common resource need either privatization or put under surveillance. Since the mid-1980s, discussions over what kind of institution arrangements accounts for sustainable resource use have undergone remarkable change in the worldwide, most notably are the research progress in common property arrangement and common-pool resources, in which most of commons studies believe neither PPR nor state intervention could work and some control must be devolved to local user over resource. Arun Agrawal (2001) gave comparisons of existing studies and provided measures of those dependent variables used on the commons. For china's grassland conservation, however, discussions about PPR of grassland are necessary, china's meadow management based on HRS which in fact PPR may provide a profound view and experience for resource governing.

Different with other commons such as sea fish and forest, grassland more like market goods, which is separable individually in area and is controllable for access, so in theory it more fits for PPR, and according to rational man hypothesis, herdsmen acquire not only short-term product revenue but long-term property rights revenue, therefor they will adopt some conservative measure for future property revenue, and then meadow not only provides animal product and well ecologic environment, but that does not accord with reality. The fact that grasslands serious degradation following china's institution reform cannot been well explained for grazing HRS in fact endows the pasture's PPR to the herdsmen.

The intuition behind our result is simple. Under the conventional economics competitive paradigm, in which resource is significant only to production but few consideration applied to the effect to ecology. A herdsman whatever who is short-sighted or far-sighted more pay attention to the asset revenue and value other than the role of resource in consideration to society such as ecology or culture meanings. In some constraints the herdsman will adopt some fast discount.

This paper seeks to find an explanation of grassland degradation under PPR. Neoclassical economics assumption will be maintained and a production function including two factors is introduced, and share-cropping theory is applied to analyze a contract between herdsmen and herd owner. Through our analysis, we found the risk preference of contract parties is crucial to grassland degradation It was traditionally believed that animal husbandry and farming have the same feature after produced by their land and labor. In fact, too much labor is not dispensable for grazing practice compared with farming. The output is easier to monitor through the weight

[1] Any property rights have their limitation, so do private property rights (PPR), according to china's HRS, the endowed grassland of herdsmen has included the rights to exclusive use, to gain, and to transfer in a fixed periods; so from a view of broad meanings of PPR, we can say in China herdsmen's grassland is PPR.

and survival rate of animals. Less labor means grazing is more economical efficiency of scale than farming. Here scale effect means increased animal production without cost of labor and supervision addtion. It will focus on how grazing HRS will impact grassland utilization with new institutional economics in grazing research.

In order to explore the relation and mechanism between china grazing HRS and grasslands degradation, its history was reviewed in the first part of the paper. The production function and the institution characteristics of grazing were describe in the second part. In the third part, after introduced expected utility function, solved the grazing production dispersion equilibrium, it was analyzed the nature of institution and the relationship between overgrazing and grassland degradation. The fourth part is a summary of the full text.

1. LITERATURE REVIEW

1.1 Transaction Costs and Sharing Contracts in Agriculture

A traditional belief of economists is that the fixed rent is better than sharing rent. This argument can date back to Adam Smith (Yang, 2001). These early views on land tenure are mainly from the British economist, Marshall. The views Hayami and Otsuka (1993, p.29) have made a detailed exposition. In fact, transaction costs will not be considered in agriculture production by traditional economics. “best” institution was always taken as effective prescription, but real world has inevitable positive transaction costs, then kinds of institutions do works, and the sharing contracts and fixed rent in different circumstance may be Pareto efficient, although the condition of marginal equal is not established.

Cheung (1968) first questioned that the contract of tenant share is inefficient. Cheung’s analysis shows that the traditional economics assumed that production risk is certain, whereas in fact uncertainty was existed in the production of agriculture. Assumed tenant farmer is risk aversion, a sharing contract will be provided by the landlord. Cheung also found that tenant’s labor must be monitored to gain more production in this case. Stiglitz (1974) first grasped the perspective that one trade-off dilemma was confronted with the sharing rent between risk-sharing and work incentives. In his analysis framework, the lower share ratio indicates, smaller risks the tenant have to bear. The higher share ratio will give tenants an incentive to work hard. The consideration to the risk-sharing and incentive will make tenant obtain more production but not simply considered only one risk factor. One flaw in Stiglitz’s theoretical framework is that the sharing system has no advantage to the fixed one when parties of the contracts are risk neutral.

The General assumption of the literature is whether the landlord will use the same ratio of the output to share a part of the cost. According to Braverman and Stiglitz’s (1982) studies, the proportional rules will no longer valid once the asymmetric and uncertainty of the information is introduced. Bardhan (1983) developed this study. Newberry (1977) investigate the advantages of sharing institution from the perspective of the market risk.

Eswaran and Kotwal (1985) investigated the sharing contract from the perspective of double incentives. If the tenant can get all the residual outputs of the land, nothing will obtain by the landlord. The tenant gets the maximum incentive and the landlord get nothing incentive. On the contrary, if the landlord obtains all the marginal production of land, tenant won’t get any marginal output. At this time, the landlord maximums his incentive and the tenant get nothing incentive.

After reviewed above, it was found that the analysis of sharing contract most focused on the farming industry, whereas rarely on the grassland grazing production. the reason for that the grassland grazing has more complexity involves not only land and labor but also animal stocks, the economic interests of the herders and the ecology of the grassland. That is to say, grassland grazing has the property of ecological public goods.

1.2 New Institution Economic Analysis of Grassland Animal Husbandry

Contrasted with the significant academic achievements in farming studies, new classical economics was encountered with great puzzle in analysis of grassland grazing production. Producers wanting the maximize economic benefits often overlooks the limitations of exhaustible natural grassland productivity. Bounding to face the threat of grassland degradation, excessive will damage producers’ long-term interests and do harm to the interests of neighbor and spectator in the end. Starting with S. Gordon (1954) and G. Hardin (1968), new institutional economics become mainstreams in the analysis of grazing grassland production.

Summed up Scott Gordon’s view, Feeny, et al., (1990) believed that every fisherman in the public pool consider their own marginal costs and benefits, and ignore harm of their behavior to the return of other fishermen and the future stability of the stock pond. In this way, the public will run out of pond productivity soon, whereas damage to all participants.

Hardin (1968) argued that no restrictions access to the common for the residents will leads to the grassland degradation. The residents, who make the decision to increase the number of livestock, are rational to pursue their maximization income. But when all the people do same, grassland inevitably degraded.

Hardin (1978) believed that there were two ways to solve the problem of the commons: “private enterprise system” and “socialism”.

Eleanor Ostrom (2008) had a review to problems and practices of the common pool resources. Eleanor

Ostrom (2008) did not agree that the central government or private property is "the only way" to solve tragedy of the commons. What is more, Eleanor Ostrom (2008) argued that neither government control nor private ownership by real world cases is spontaneous solution. Ostrom's point of view has had a profound impact to the research perspectives and analysis of public (shared) resources.

Generally speaking, scholars seem like or at least don't refuse such ideas that private property right can solve the ecology problem. However, they just didn't give any demonstration in details.

1.3 Theory of Sharing Contracts and Grassland Grazing Production

The point of this paper is inspired by Barzel's (2005) contribution on measurement costs in agriculture. Barzel's (2005) pointed that for some attributions haven't been made a price due to high measurement costs in farming. The use sizes attributed haven't reached best sizes in the marginal condition will lead to moral risk behaviors of parties of the contract. The input includes grassland, animal stock, labor and forage and such input as labor and forage is easy to check in grassland grazing. it was assumed that fixed gains can be earned by labor and forage, which can be bought or employ by market. Here we focus on grassland and animal stock. Grassland productivity is uncertainty influenced by such factor as season, precipitation and soil fertility. Likewise, animal stock production is uncertainty influenced by such factor as falling ill and weak. It was thought there are some transaction costs when the two factors into production or some contracts. According to Barzel's analysis (2005), the more difficult to measure factor attribute, the more important to affect team production, the more attributes to share residue. In case of grazing, both the grassland and livestock are important to the final production, and their contribution to the production is difficult to measure. in case of grazing, the respective owners of grassland and livestock will enter into a contract or organization to ensure benefit of both sides. One of the benefits to owner of grassland is to guarantee optimal use of the grassland not to degradation. If Barzel's conclusion is true, how to explain the degradation of china's grassland took place just in time, as the two factors have freedom to contracts?

It was argued that the sharing contract theory is still the appropriate framework to the economic analysis of grassland grazing. Based on reasonable assumptions, the conclusions of the framework is important to the contract theory as well as to the ecological economic theory.

2. METHOD

Based above analysis, it was assumed that there are two actors in grassland grazing, rancher and the herdsman. The rancher owns meadows and herdsman owns livestock at the same time. They must cooperate in order to produce animals. For simplicity, in the basic model without considering such factors as policy control, forage input and labor input.

2.1 Model Explanations

Suppose T is the grassland input rancher owns, K is livestock input the herdsman owns. For any pasture, the output Q is the constant returns to scale function of land T and livestock K.

$$Q = F(h(\theta)T, K) \tag{1}$$

θ stands for the uncertainty of grassland production induced by season, precipitation and soil fertility, $h(\theta)$ stands for the output loss due to uncertainty in any quantity inputs of T and K.

As F is a homogeneous function, the following equation will be established:

$$Q/T = h(\theta)F(K/T, 1) \equiv h(\theta)f(k) \tag{2}$$

In this equation, $k=K/T$ and $Eg(\theta)\equiv 1, \sigma_g^2 \equiv E(g\text{-}1)^2 > 0$, assume further that

$$f' > 0, f'' < 0 \tag{3}$$

2.2 Model Parameters and the Characteristics of the Contract

Assume that Y_t is the rancher's income, Y_k is the herdsman's income, there

$$Y_t = \alpha Q/T + \beta \tag{4a}$$

$$Y_k = (1-\alpha)Q - \beta T \tag{4b}$$

Among, $0 \le \alpha \le 1$

2.2.1 Purely Grazing Sharing Contracts

$\beta=0$, and $1>\alpha>0$. Herdsman and rancher share the benefits according to the sharing ratio agreement.

2.2.2 Grassland Rental Contract

$\alpha=0$, and $\beta<0$. The herdsman leases grassland and bears all the risks and benefits of production, and β is promissory rent paid by herdsman.

2.2.3 Animal Rental Contract (Agistment Contract)

$\alpha=1$, and $\beta<0$, the rancher leases herdsman's animals and obtains all the residual and the herdsman will obtain a promissory money (β).

2.2.4 A Mix of Sharing and Rental Contracts

$\beta \neq 0, \alpha \prec (0,1)$ and $\neq \{0,1\}$, different from the purely grazing sharing contract, the mix of sharing and rental contract. There is a fixed amount of compensation for grassland or interest of livestock be paid by the user of factor.

To analyze complexity of grazing production, it was ignored the production carried out by a single proprietor who owns both grassland and livestock, for which goes against division of labor. The reality contracts of the grazing economic probable one of the five types as mentioned above. The question is that which of contracts will be adopted under competitive equilibrium of grassland grazing, which can be simplified to decision problem of α,β.

3. SEPARATING EQUILIBRIUM AND ITS CONTRACTUAL NATURE OF THE PASTURE PRODUCTION

This section focuses on the optimal decision problem of both parties under uncertainty.

3.1 The Risk-Averse Rancher' Choice of Utility Maximization

U_t and U_k are rancher's and herdsman's utility function. It was assumed both of them are risk aversion, that is $U''_t, U''_k<0$, constant prairie supply of the rancher.

Averaging the rancher' income, there is

$$Y_t(\theta) = \alpha h(\theta) f(k) + \beta \tag{5}$$

$$\text{So,} \quad x \equiv \alpha f(k) \tag{6}$$

Then, the revenue stream characteristics of the rancher can be expressed by x,β. At β given level, the rancher prefers a larger x, set the level of x, then prefers the larger β. In the optional contracts, β is a function of x for any given x.

$$\beta = \beta(x) \tag{7}$$

The rancher' utility maximization can be expressed by, max $EU_t[Y_t(\theta)]=EU_t[xh(\theta)+\beta(x)]$, if β is differentiable, there is

$$\frac{EU_t^{'}h}{EU_t^{'}} = -\beta' \tag{8}$$

That,

$$EU_t[Y_t(\theta)] = V_t(x,\beta) \tag{9}$$

Given the rancher' characteristics of risk aversion, U_t is a concave function on Y, and $V(x,\beta)$ is a concave function. The rancher will choose the largest β contract at any x level.

3.2 Basic Model'S Characteristic of Contract

Completely symmetrical analysis is suitable for herdsman, assume that V_k is the convex function of x,β, herdsman's Utility is decreasing with x,β, only the contract that β is the minimize at any x level can be signed. Then the rancher will sign the contract that β is maximal at any x level, so actually, the contract will fall on the straight line which is defined by the equation $\beta(x)\equiv\hat{\beta}(x)$. Whether the $\beta(x)$ is convex or concave function (see Figure 3), the final contract will only be A (or A') and B (B'or B").

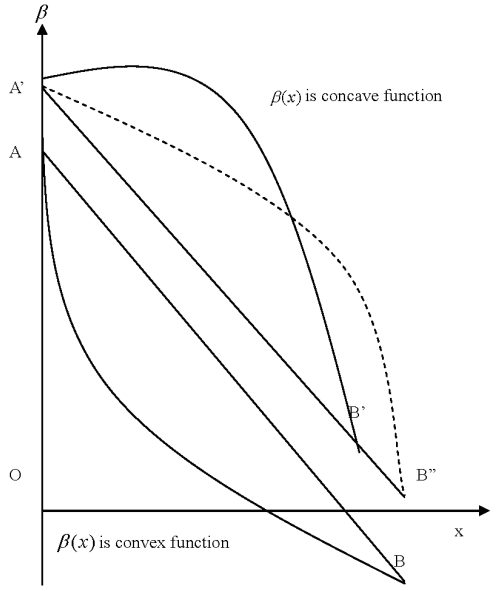

Figure 3
The Contract Trait of Risk-Aversion Rancher and Herdsman Under Competitive Equilibrium

In reality, the set of contracts observed will fall on the curve which is defined by the equation $\beta=\beta(x)$. If both parties can be free to choose the contract and cooperator, the set of contracts observed must fall on a straight line, that is

$$\beta=-ax+b \tag{10}$$

From (1.10) the rancher' mean and variance can be deduced,

$$\overline{Y}_t \equiv x+\beta,\ \sigma_t=x\sigma_g \tag{11}$$

and further we get

$$\overline{Y}_t = p\sigma_t+b \tag{12}$$

Set $p=(1-a)/\sigma_g$, P is similar to price risk.

3.3 Alternative of the Meadows of the Rancher

Assume that the rancher have another choice to produce a given level of expected benefits $\hat{V}$, to make the rancher supply the grasslands, we must make the $V(x,\beta)\geq\hat{V}$. Assume that R_t means the minimum level of utility, then the rancher' expected utility function can be restated as following:

$$EU\equiv R_t=EU[xh+\beta] \tag{13}$$

For a given value of R_t, we can get β which is a function of x from formula (1.13), that is

$$\beta=g(x,R_t) \tag{14}$$

and

$$-\frac{\partial g}{\partial x}=\frac{EU_t^{'}h}{EU_t^{'}}\le 1 \text{ ,as } U_t^{''}\le 0 \tag{15a}$$

and

$$\frac{\partial h}{\partial R_t}=\frac{1}{EU_t^{'}}>0 \tag{15b}$$

Function g is the utility indifference curve of the rancher on (x,β), so g is a concave function.

3.4 The Choice of the Risk-Aversion Herdsman

The herdsman's income can be expressed as $Y_k(\theta)$, that is

$$Y_k(\theta)=[(1-\alpha)h(\theta)f(k)-\beta]T \tag{16a}$$

When T is the total amount of grasslands owned by the rancher, the herdsman's income is expressed as the herdsman's revenue from each unit of grassland. The revenue of the herdsman can be rewritten as:

$$Y_k(\theta)=[f(k)h(\theta)-h(\theta)x-\beta] \tag{16b}$$

Let $\hat{\beta}(x)$ is the minimum value of x corresponding to β. So the maximum expected utility of the herdsman is:

$$\max EU_k[Y_k(\theta)]=EU_k[f(k)h-hx-\hat{\beta}] \tag{17a}$$

Herdsman must satisfy the condition that the minimum utility of the rancher in competition, $V(\alpha,\beta)\ge\hat{V}$, R_t is given here.

$$V(\alpha,\beta)=\hat{V} \tag{17b}$$

Get the first-order conditions,

$$\frac{\partial EU_k}{\partial x}=-EU_k^{'}(h+\frac{\partial g}{\partial x})=0 \tag{18a}$$

and

$$\frac{\partial EU_k}{\partial k}=EU_k^{'}\left[(1-a)f^{'}h\right]=0 \tag{18b}$$

With the (1.15a), the above equation can be rewritten as,

$$a=1 \quad \text{or} \quad f^{'}=0 \tag{19a}$$

and

$$\frac{EU_k^{'}h}{EU_K^{'}}=\frac{EU_t^{'}h}{EU_t^{'}} \tag{19b}$$

(1.19a) a=1 signify rancher lease contract; f'=0 is, when the herdsman choose any other contracts, the herdsman will strive to expand the herd of livestock for achieving the maximum revenue of productivity, and surprisingly, the traits of decision-making is the same as the option that is no output risk.

Consider each option of the herdsman' expected utility maximization:

3.4.1 When a=1 and f'≠0, Herdsman Can Choose the Agistment Contract to Obtain the Fixed Revenue.

The benefits of cooperation depends only on the utility maximization of the rancher, take a = 1 into the rancher's expected utility function, and get the first derivative of k, we can get that $EU_t f'h$=0, this condition describes that the choice of agistment contracts don't change the rancher's decision on the stock of livestock.

3.4.2 When f'=0 and a≠1, the Herdsman Can Choose Other Sharing Contracts

Surprisingly, the herdsman will choose the largest stock of livestock as if it ignores the capital losses and output caused by the uncertainty which exists in animal husbandry. The conditions are diametrically opposed to 3.2.1, which may mean that in the conditions of the rancher's pasturing, it will choose the agistment contract. While in the case of the herdsman's grazing, it will choose to maintain the largest stock of livestock in order to make full use of the grassland, as it don't consider the sharing ratio.

This condition implies the possibility of overgrazing and grassland degradation.

3.4.3 The Mean and Variance of First-Order Conditions

The mean and standard deviation of the herdsman' income is given as follows:

$$\overline{Y}_k=\left[(1-a)f-g\right],\quad \sigma_k\equiv(1-a)f\sigma_h \tag{20}$$

According to (1.15 a)

$$\frac{\partial\overline{Y}_k}{\partial\alpha}=-f(1+g^{'})\le 0,\frac{\partial\overline{Y}_k}{\partial k}=f^{'}\left[1-a(1+g^{'})\right] \tag{21a}$$

$$\frac{\partial\sigma_k}{\partial\alpha}=-f\sigma_g<0,\frac{\partial\sigma_k}{\partial k}=(1-a)f^{'}\sigma_g>0 \tag{21b}$$

3.5 The Extended Analysis of Decentralized Equilibrium Theory

3.5.1 If the Rancher Is Risk-Neutral, There Is 1+g'=0. Adding the Value of α Will Make the Mean Unchanged and the Variance Decrease.

Let α=1, selecting k to make the value of $\overline{Y}_k$ maximize (σ_h=0 at this time), i.e. f'=0. Assumed the area of grassland a fixed value, herdsman will increase ewes until the maximum output.

3.5.2 If the Herdsman Is Risk-Neutral, It Will Choose α to Maximize $\overline{Y}_k$; If α=0 at This Time, Then Selecting k Make f'=0 .

3.5.3 More General, If Both of the Herdsman and the Rancher Are Risk Aversion, They Will Stop Investment in the Livestock Before Reaching Maximum Expect

Production, Because the Standard Deviation Is Also Rising Along With the Expected Output to Increase.

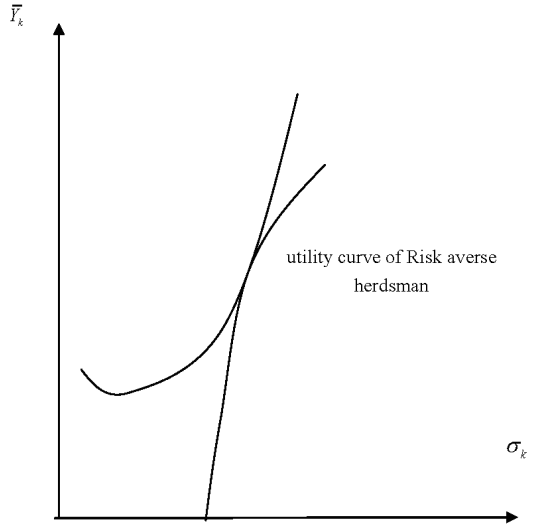

Figure 4
Given α, Risk Averse Herdsman K Choice

3.5.4 Given the Value of k, the Mean and Variance of the Total Output, the Sum of Income Standard Deviation of the Herdsman and the Rancher Equal to the Total Standard Deviation

The expected income of the herdsman and the rancher is equal to the total expected income. It can be represented all the collocation set with the box (Figure 4). The question to be solved is how to configure the mean and the variance on the herdsman and the rancher. For the herdsman, the utility level of the rancher is given, the possibility they can pay rent to the rancher as denote $r=h(0,r_t)$ will be faced, and take all the risks by themselves. Improving the sharing ratio will increase the expectation rent to the rancher, and reduce the standard deviation of indifference curve.

The herdsman will select one point where the indifference curve of the herdsman is tangent to the rancher's. If the point of tangency falls on the diagonal line (Figure 5) and point B, which means a pure sharing contract, and the mean and the variance will be prorated between the herdsman and the rancher. If the point is a corner solution falling on horizontal axis, then the rental contract will be chosen such as point D, or something of the agistment contract be chosen such as point C. If the point falls on the any value of the variance, it means that one is more risk-aversion than the other. One side of risk-neutral will bear all the risks.

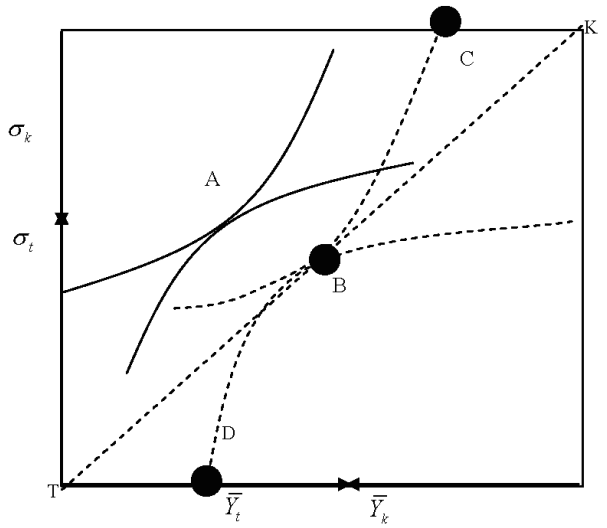

Figure 5
Allocation of the Mean-Ariance of Herdsman and Rancher

CONCLUSION

Compared with the existing literatures on sharing contract, such as Joseph and E Stiglitz (1974) indicated that sharing institution played a key role in incentive and risks distributional, the main contribution of this paper is to introduce the sharing contract theory and uncertainty to the economic analysis of grassland grazing, and to discuss basic attribute of major grazing contracts and basic relationship between grassland degradation and contract attribute, respectively. Although new institution economic theories give promising in study of grassland grazing economy, it is short of general analysis frame and limits application of the theory for the study of grassland grazing.

It is to propose a facilitated analysis framework for discussing the application of sharing contract theories in grazing. the internal mechanism of grassland grazing contracts was explored with this framework. the basic features of different types of contracts was shown based on different parameter (α, β) through studying basic feature of homogeneous production function of two different input factors under uncertainty conditions. The exploration particular focused on the nature of the contract under condition that the expected utility is maximize and the dispersion equalization under the assumption at different risk preferences. Then, the relations and mechanisms were inspected between the grazing contract and grassland degradation. This analysis framework can be further extended to analyze the contract' feature under such following conditions as asymmetric information, carrying capacity control of pastures and the sharing of labor cost and forage The study of this framework helps explain the specific contract of grazing industry and its ecological and cultural meanings.

The main entries of conclusions as following:

Many grazing contracts could be chosen on the condition of constant returns to scale and risk-aversion utility function;

In the strict risk aversion utility function and a decentralized equilibrium expected utility maximization of parties to the contract. There have two possible optimal choices: one of which is agistment contract by the rancher. It means that the owner of the larger grassland is responsible for grazing after a revenue share decided.

Driven by the expected utility maximization, either party are of risk aversion. Choice of either party will induce the risk of overstocks. That means greater profits will be made by bigger livestock herds.

It is proved that if both parties have characteristics of risk neutral, they will increase the stock of animals (dams) till the maximum output. The maximum output implies the risk of overgrazing, and the risk of overgrazing is an important factor of grassland degradation. Risk preference type of the one responsible for grazing will radically determine whether grassland overgrazed or not. It was proved that provided any party to the contract prefers the risk neutral type and to choose overgrazing. This conclusion is helpful for further study of the grazing culture in the role of preventing grassland degradation.

REFERENCES

Agrawal, A. (2001). Common property institutions and sustainable governance of resources. *World Development, 29*(10).

Bardhan, P. (1983). Labor tying in a poor agrarian economy: A theoretical and empirical analysis. *Quarterly Journal of Economics*, August.

Barzel, Y., & Suen, W. (2005). Moral hazard, monitoring cost, and the choice of contracts. *NTU Business Review, 5*.

Berkes, F. (2004). Rethinking community based conservation. *Conservation Biology*, *18*(3).

Braverman, A., & Stiglitz, J. (1982). Sharecropping and the interlinking of agrarian markets. *American Economic Review*, (6).

Cheung, S. (1968, December). Private property rights and sharecropping. *J. Polit. Econ., 76*, 1107-1022.

Cheung, S. (1970, April). The structure of a contract and the theory of a non-exclusive resource. *J. Law Econ., 13*, 49-70.

Elinor, O. (2008). The challenge of common-pool resources. *Environment*, *7*.

Feeny, D., Berkes, F., Mccay, B., & Acheson, J. (1990). The tragedy of the commons: Twenty-two years later. *Human Ecology, 18*, 1-19.

Furubotn, E. G., & Pejovich, S. (1972, December). Property rights and economic theory: A survey of recent literature. *Journal of Economic Literature*, *10*(4), 1137-1162.

Gordon, H. S. (1954). The economic theory of a common property resource: The fishery. *Journal of Political Economy, 62*, 124-142.

Hardin, G. (1968). The tragedy of the commons. *Science, 162,* 1243-1248.

Hardin, G. (1978). Political requirements for preserving our common heritage. In H. P. Brokaw (Ed.), *Wildlife and America* (pp.310-317). Washington, D. C.: Council on Environmental Quality.

Hayami,Y., & Otsuka, K. (1993). *The economics of contract choice: An agrarian perspective*. London: Clarendon Press.

Mancur, O. (1995). *Logic of collective action: Public goods* (pp.64,70). Y. Chen, Y. F. Guo, & C. X. Li (Trans.). Shanghai: Shanghai people Press.

Mukesh, E., & Ashok, K. (1985). A theory of contractual structure in agriculture. *American Economic Review*, 352-367.

Newbery, D. M. G. (1977). Risk-sharing, sharecropping and uncertain labor markets. *Review of Economic Studies, 44*, 585-594.

Oplhuls, W., Oblivion, L., & Daly, H. E. (1973). *Toward a steady state economy* (pp.215-3001). San Francisco: W H Freeman.

Ostrom, E. (1999). Coping with tragedies of commons. *Annu. Rev. Polit. Sci., 2,* 493-535.

Ostrom, E. (2000). *Governing the commons: The evolution of institutions for collective action* (pp.9-44). X. D. Yu, & X. D. Yu (Trans.). Shanghai: Shanghai Joint Publishing.

State Environmental Protection Administration (2005, pp.72-73). Environment Condition Bulletin of China.

Stiglitz, J. E. (1974). Incentives and risk sharing in sharecropping. *Rev. Econ. Stud.*, *61,* 219-56.

Yang, X. K. (2001). *Economics: New classical versus neoclassical frameworks* (pp.181-215). Malden, MA: Blackwell Publishers.