

INFLUENCE OF RANGE LAND OF THE SETTLED CAMP OF GERS ON LIVESTOCK HEALTH AND FOOD SECURITY

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KEY WORDS: *settled camp of gers, soil, plantation, water, micro element and heavy metal*

Purpose: *In this research we have determined impact of activities of the settled herders on soil, water and plantation of degraded pasture land caused by distortion of technology of cattle breeding, content of some chemicals in blood serum of livestock as well as plantation number and cover.*

Conclusions: *1. Grazing crop of the settled camp of gers is less by 3-6 species and cover size is less by 8-10 percent compared to the control area.*

2. It has been determined that content of Cu, Co, Se, Pb in soil and plant of pasture land of the settled camp of gers in close pasture land Zn, Fe is the least in close and middle pasture lands and the most in remote pasture land.

3. Copper contained in water is higher by 0.132 ppm than the internationally accepted highest level, zinc is less by 0.233 ppm and iron, cobalt, selenium and lead is 2-7 times more than the permissible highest level.

4. Copper, zinc, cobalt and iron contained in the blood serum of the livestock of the settled camp of gers is less than normal psychological amount and selenium and lead are higher than the permissible amount.

5. Much heavy metal contained in soil, water and plant of the close pasture land of the settled camp of gers is determined by much content of selenium and lead in the serum that may affect food security and social health.

INTRODUCTION

As Mongolia is exposed to the climatic change more its impacts have been clearly detected on livestock health and herd quality and have been observed in their habitat more. On the other hand, with regard to changes to the social trend of Mongolia and transition of herders to settled life from traditional way of life they have lost their selected method to use remote land following transparent water and fresh range land and preferring their comfortable living and moving 2-4

times per year including winter place-summer camp, winter place-spring quarter-summer camp, winter place-summer camp-autumn quarter. Also there are not few “settled camp of gers” that settles down on one winter place for 4 seasons [2]. In developing countries most percent of the population is dependent on animal husbandry but study on mutual dependence of climatic changes and animal husbandry has been forgotten at all [19].

Movement from the countryside to the urban place has been going rapidly and demands for the livestock products will be increased along with it [8].

Growing period of grazing crop of Mongolia is 150 days and range land based animal husbandry is run mainly thus it belongs to dry and half dry range land system according to the classification of Steinfeld and others. Climatic change impacts on the dry and half dry range land system more than other systems. Those impacts include decrease in harvest amount and water supply, change in occurrence and spread of human, livestock and plant diseases, change in the disease transmitter, change in the biodiversity, changes in living, livelihood and subsistence and other direct impacts. The most urgent issue from them is to influence in the human health through livestock originated foods [14].

However average warmth of Mongolia has increased by 2.14°C for recently frost momentum is increased in winter. According to the surface water count 852 from 5128 rivers, 2277 from 9306 streams and natural spa, 1181 from 3747 lakes and ponds have been dried out. Study on intensity of impacts on regions in the vicinity of Inner Mongolia and Baikal, Russian Federation and animal husbandry, forest steppe and steppe regions of Mongolia has determined that hygrophite plants have been decreasing and xerophyte plants have been increasing. So productivity has decreased by 1.4-7.0 % [16].

When various livestock is on own appropriate range land, it has been breeding normally and its productivity is stable. In some places livestock productivity is less, growth is slow and much perish due to disease. It depends on how the livestock got used to the growth stages, species and chemical content of grazing crop, chemical component of soil and water and climatic condition of that particular land.

On the other hand as Mongolia has been affected by the global warmth and climatic changes its impacts have been more impacting on livestock health and their living and habitat changes. In other words due to peculiar feature of particular land endemic disease that commonly occurs among the range land livestock not only occurs in the livestock but also except for human sickness of that land it becomes endemic disorder caused by plants and common occurrence of poisoning [4]. Cobalt supports hemogenesis and carbohydrate and minerals exchange. When the organism is lack of cobalt it causes abnormalities including anaemia, loss of appetite and emaciation. Selenium is included in component of

glutathionperoxidase ferment and it decomposes hyper oxide and prevents necrosis and degeneration. Copper is a micro element that plays important role on hemogenesis and osteal generation and hair and wool growth and it is included in component of many enzymes including cytochrome oxidase, tyrosinase, ceruloplasmin and galactose oxidase so it participates in all kinds of metabolisms and tissue breath. Copper deficiency causes abnormalities including anaemia, slowness in growth, degeneration of brain and spinal tissues and hair and wool become white [4]. Disease caused by copper deficiency is called "orongi" in Mongolian. It is revealed by serious and light forms and 40-60% of lambs of farm where this disease spreads is perished and 80-90% of sick new born young animals is dead [1]. Anaemia is caused by deficiency of iron, copper, cobalt and manganese in fodder which are micro elements that participate and activate hemogenesis [3]. Zinc is accumulated in bone, skin and hair of the livestock in most amounts. Zinc is included in structure of carbonic anhydrase, pancreatic carboxypeptidase, glutamine, dehydrogenase enzyme of lactic acid. Also except for activating other enzymes 75% of total zinc in the organism is located in red corpuscle and integrates carbonic acid gas in it and releases from the body. Therefore, when zinc is lacking disorders including slowness in growth, skin exfoliation and inflammation, natural abortion, abnormal young animal and weak living ability of the young animal occur. Lead is toxic substance that impacts almost all organs and system and pollutes environment and it affects mentality, kidney, blood formation and reproductive system [13]. Lead is called nervous poison and it is dangerous to slow down and delay child growth and brain development. Selenium compounds that dissolve easily in water more poisonous than the compounds that dissolve with great difficulty [15]. Micro elements are important elements that are regulated by physiological mechanism as well as they can cause serious damage to human and livestock health if their regulation is lost. In particular we can mention zinc here [9].

We have conducted this work due to proper requirement to study and determine impacts of the range land degradation caused by the climatic change, global warmth, activities of the settled herders and technological distortion in livestock breeding on the soil, water, plant, content of some chemicals contained in the livestock blood serum, number of plant species and its cover.

RESEARCH MATERIALS AND METHODOLOGY

We have selected the settled camp of gers in Yoruu soum, Selenge aimag and divided range land into 3 zones. We have randomly selected 1m² area within 250 m² land within the range land that can represent soil, water and plant of 1st zone or close range land (within 0.5-2 km circle), 2nd zone or medium distance range land (within 3-5 km circle) and 3rd zone or remote range land (within 8-10 km circle). We used 1-3 kg of plant sample, 3-5 kg of soil sample, 2 l water sample from each point selected three times in June, 2011 – 2013 and the blood serum of 128 livestock including 30 he goats, 30 she goats, 30 rams, 30 ewes and 18 cows of that settled camp of gers for the analysis and research work. Also content of some chemicals have been determined in 45 soil samples, 45 plant samples, 10 water samples totaling 221 samples by full reflection X-ray fluorescence spectrometer. We have carried out the analysis by diluting blood serum covered by the analysis by 10 times, carbonizing 5gr plant sample at 150°C, turning to ash completely at 500°C and transferring it into solution form.

Results and discussion: 1. Plantation of mountain steppe, flood plain and river valley has been dominated within the range land of the settled camp of gers.

As for plant species and cover of grazing crop of the settled camp of gers there are 3 species of plant with 42% cover including *C. duriuscula*, *A. firgidia*, *P. anserine* within 1m² area in close range

land (500m) and 6 species of plant including *S. squarrosa*, *K. macrantha*, *S. sibirica*, *C. duriuscula*, *A. frigida*, *P. acaulis* and plant cover in the vicinity of winter place of the settled camp of gers or control area is 51%.

7 species of plants with 47% cover including *S. squarrosa*, *K. macrantha*, *S. krylovii*, *S. sibirica*, *C. duriuscula*, *A. frigida*, *P. acaulis* within 1m² area in medium distance range land (3000m) have been registered and 11 species with 57% including *S. krylovii*, *A. cristatum*, *P. bifurca*, *C. duriuscula*, *S. squarrosa*, *A. frigida*, *A. adamsii*, *P. acaulis*, *A. firgidia*, *K. prostrata*, *F. sibiricum* registered within the control area.

10 plants including *K. macrantha*, *S. krylovii*, *S. squarrosa*, *S. sibirica*, *C. duriuscula*, *A. frigida*, *P. bifurca*, *A. adamsii*, *P. acaulis*, *A. firgidia* with 54% cover have grown within 1m² area in remote range land. Then 15 species of plants including *S. squarrosa*, *S. sibirica*, *S. baicalensis*, *K. macrantha*, *A. cristatum*, *A. frigida*, *P. acaulis*, *F. sibiricum*, *C. duriuscula*, *A. odorum*, *A. adamsii*, *K. prostrata*, *P. anserine*, *P. turczaninovi*, *P. lanacetifolia* with 62% cover have grown in the control zone.

Content of some micro and macro elements have been determined in the plant samples prepared from the selected points of the range land of the settled camp of gers (Table 1).

Amount of some chemicals contained in grazing crop (ppm)

Table 1

Name of micro organism	Close range land	Medium distance range land	Remote range land	V.V.Kovalskii, 1970
Copper (Cu)	0.386±0.01	0.751±0.012	12.53±1.01	3-12 мг/кг
Zinc (Zn)	1.242±0.02	1.127±0.02	7.786±0.91	20-60 мг/кг
Iron (Fe)	1.344±0.02	0.684±0.01	5.962±0.62	24-30 мг/кг
Cobalt (Co)	0.266±0.01	0.352±0.01	0.454±0.01	0.25-1.0 мг/кг
Selen (Se)	0.192±0.01	0.27±0.01	0.286±0.01	0.1-2.0 мг/кг<
Lead (Pb)	0.309±0.01	0.383±0.01	1.193±0.002	90-300 EU Stand 100 MN Stand

According to the results of the analysis content of Cu, Zn, Fe, Co, Se, Pb is 0.386; 1.242; 1.344; 0.266; 0.192; 0.309 ppm in sample of plantation cover of the close rangeland of the settled camp of gers, 0.751; 1.127; 0.684; 0.352; 0.27; 0.383 ppm in medium distance range land and 12.53; 7.786; 5.962; 0.4

54; 0.286; 1.193 ppm in remote range land. It is equal and less compared to the copper content contained in grazing crop determined by the researchers [3] Co, Se at normal and Zn, Fe, Pb amount is less than normal level.

2. Results taken soil sample from the selected section of that range land and determined some micro elements and heavy metal contained in it are shown below (Table 2).

Content of some micro elements and heavy metal contained in the range land soil, ppm

Table 2

Micro element	Close range land	Medium distance range land	Remote range land	Permissible value, mg/kg
Copper (Cu)	0.84±0.01	0.906±0.012	1.905±0.001	24.7-38.0 ⁺
Zinc (Zn)	4.416±0.02	3.594±0.002	4.599±0.312	60 ⁺
Iron (Fe)	1130.685±0.9	332.937±0.9	656.604±0.9	No information
Cobalt (Co)	1.581±0.02	2.913±0.01	4.224±0.01	50 MNS
Selenium (Se)	0.456±0.01	0.774±0.01	2.679±0.01	10 MNS
Lead (Pb)	0.528±0.01	1.224±0.01	2.541±0.01	90-300 EUStand [7,10,11] 100 MNS

⁺ Norm in the soil of Mongolia [5]

According to the above table content of Cu, Co, Se, Pb is increased in the remote range land compared to the close range land while zinc has no much difference and iron is not stable.

According to the result of the above research it is less than the zinc amount [4] in the soil of other aimags (Arkhangai 54±14, Bayankhongor 60±12, Zavkhan 63±2 mg/kg) but it has not reached to the

deficiency amount (<3mg/kg) and Cu, Co and Se amount is less.

3. Results of the study determined amount of some micro elements and heavy metal contained in the blood serum of cow, sheep and goat of the settled camp of gers (Table 3).

Results determined some micro elements and heavy metal contained in the serum, ppm

Table 3

Name of micro organism	Goat		Sheep		Cow n=18	Normal amount
	Female n=30	Male n=30	Female n=30	Male n=30		
Copper (Cu)	83.9±2.1	60.1±1.25	97.9±3.11	88.8±3.25	75.7±3.22	^x 1000-1300
Zinc (Zn)	105.6±3.2	82.7±2.35	112.8±4.21	114.8±4.21	81.0±3.32	^y 800-1400
Iron (Fe)	124.4±0.08	169.1±0.6	204.3±0.24	135.±0.24	222.0±0.45	^y 130000-250000
Cobalt (Co)	41.5±0.05	26.1±0.4	37.9±0.06	46.9±0.06	42.7±0.06	^x 100-120
Selen (Se)	33.0±0.1	26.7±0.05	30.9±0.05	39.4±0.06	53.2±0.2	^y 0.07-0.1
Lead (Pb)	57.4±2.2	53.7±0.13	53.7±0.09	61.5±0.08	58.2±0.09	⁺ 0.05-0.23

⁺ - V. Rajaganapathy, 2011 [17], ^y cow - Anderson, D. E., 2009 [6], ^x sheep – A.Sodnomdarjaa and others, 2012

According to the results of the above analysis content of Cu, Zn, Fe, Co in blood serum of sheep, goat and cow is 60.1-97.9; 81.0-114.8; 135.9-222.0; 26.1-46.9 or lacking and Se, Pb 26.7-53.2; 53.7-61.5 ppm or redundant. According to the determination by researchers [3] copper amount in the serum is less by 2-3 times compared to the normal amount and it has been determined copper deficiency. Res

ult of our research which determines 10-16 times less amount proves potential occurrence of copper deficiency.

4. We have taken sample from small tributary of Yoruu river or water where livestock of that settlement drinks water and used it as research material (Table 4).

Content of some chemicals contained in water (ppm)

Table 4

Name of micro organism	Amount contained in water	Permissible value, mg/l			
		Mongolia	WHO	USA	EU
Copper (Cu)	1.132±0.02	1.0	2	1.3	-
Zinc (Zn)	0.767±0.001	1.0	5-15	5	2
Iron (Fe)	1.353±0.02	-	0.3	-	0.2
Cobalt (Co)	0.484±0.001	-	-	-	-
Selenium (Se)	0.346±0.001	-	0.01	-	-
Lead (Pb)	0.728±0.01	-	0.1-0.05 ppm	-	-

While accepted highest amount of copper contained in water is 1 ppm and it is higher by 1.132 ppm or 0.132 ppm and zinc is less by 0.233 ppm

, iron, cobalt, selenium and lead is 2-7 times more than the accepted highest amount according to our measurement.

CONCLUSION

Grazing crop of the settled camp of gers is less by 3-6 species and cover size is less by 8-10 percent compared to the control area and it shows degradation of range land.

2. It has been determined that content of Cu, Co, Se, Pb in soil and plant of pasture land of the settled camp of gers in close pasture land Zn, Fe is the least in close and middle pasture lands and the most in remote pasture land

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