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Seasonal changes on trace elements and analysis of their sufficiency or lack in Soil-Forage-Animal ecosystem in stud farm around Qinghai Lake

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Key words: Qinghai, trace element, content, soil-forage-animal ecosystem, seasonal changes

Introduction The study on research and utilization of trace elements about soil-forage-animal ecosystem in Qinghai province was little before, which limited the development of plateau husbandry at a certain extent. So, we did the experiment about the seasonal changes of the system. It has significant meaning to take full advantage of superior natural conditions, increase local economic returns and improve ecological environment.

Materials and methods Six trace elements (Cu, Mn, Fe, Zn, Mo, Se) analyzed came from water, soil, edible grass (gained by fistula set on esophagus), wool and other organs in sheep such as plasma, liver, skeleton, etc. in Sanjiaocheng stud farm around Qinghai Lake. Cu, Mn, Zn, Fe were tested by ZAAS of 180-80 type and Mo, Se by OS of JP-2 type, statistical analysis was made by SPSS 11.5.

Results (1) The contents of Cu, Mn, Fe, Zn, Mo, Se vary with season. From general level, the soil is in critical lack of Cu ($10.81 \pm 0.23 \sim 15.09 \pm 0.78$ mg/kg), the same conclusion as Zhang C. J. (Zhang C. J., 1998); abundance of Fe ($808.5 \sim 13085$ mg/kg), serious lack of Se ($0.08 \sim 0.31$ mg/kg) and Mo is lower than normal level (Li G. H., 1995); (2) According to Grass Classification index (Zhou Z. Y., 1990; Li G. H., 1995), in edible grass, contents of Cu, Mn, Fe, Zn, Mo are all higher in summer than in autumn and than in winter, except for Se; Contents of Fe ($43.51 \pm 32.25 \sim 385.81 \pm 183.16$ mg/kg), Mn ($27.94 \pm 7.58 \sim 102.92 \pm 33.70$ mg/kg) are higher and Zn ($8.33 \pm 3.09 \sim 32.96 \pm 8.56$ mg/kg), Mo ($0.31 \pm 0.06 \sim 0.93 \pm 0.21$ mg/kg) are in critical lack condition in three seasons, but it lacks Cu (27.94 ± 7.58 mg/kg) in winter and lacks Se (0.01 ± 0.07 mg/kg) in summer specially; (3) Contents of six trace elements in sheep hair changed with season too. The change regulation of Fe ($92.83 \pm 24.86 \sim 283.46 \pm 218.69$ mg/kg) is the same as in soil and in edible grass, that is in normal level (Li G. H., 1995). Cu ($1.87 \pm 0.32 \sim 4.51 \pm 1.61$ mg/kg), Mn ($4.17 \pm 2.15 \sim 10.36 \pm 4.87$ mg/kg), Zn ($75.65 \pm 10.04 \sim 101.19 \pm 7.31$ mg/kg), Mo ($0.016 \pm 0.09 \sim 0.52 \pm 0.14$ mg/kg) are all lower than normal level (Li G. H., 1995), Se is enough (0.30 ± 0.19 mg/kg) in summer while lack seriously (0.002 ± 0.079 mg/kg) in winter, which is significantly lower than value of lack (0.079 mg/kg) (Li G. H., 1995) ($p < 0.01$); (4) The content level in sheep is nearing lack of Cu, plenty of Fe, and serious lack of Se from plasma and other organs such as liver, heart, lung, etc. of three seasons.

Conclusion The soil is in the condition of lack of Cu, Zn, Mo, Se in the stud farm around Qinghai Lake. In edible grass, expect for Cu is lack in winter and Se lack in summer, Mn and Fe can meet animal need completely while Zn and Mo meet the need basicaly. It is in such nutritional condition for sheep that the level of trace elements is plenty of Fe, lack of Cu, nearing lack of Zn, Mo and serious lack of Se. The trace element additive including Cu, Zn, Mo, Se is suggested to supply for grazing sheep in the stud farm around Qinghai Lake.

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