Advances in Fibre Production Science in South American Camelids and other Fibre Animals

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Abstracts

Effect of Technological Alternatives in the Mitigation of Climate Change in the Aging of Alpacas above 4,000 msnm Puno-Peru

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Abstract. The objective of the study was to evaluate the effect of technological alternatives in the mitigation of climate change in the breeding of alpacas over 4,000 meters above sea level. The validation study was conducted in 06 farming communities of two agroecological zones of the Puno region. The variables under study were weight at birth, weight at weaning, weight of fleece, pregnancy and mortality percentage, during 2014 in which no technological alternatives were applied, while in 2015 and 2016 this set was applied of alternatives. The data were analyzed in a completely randomized design using the SAS statistical software version 9.4. The results show that the birth weights were of 6.01, 6.254 and 6.83 kg for the years 2014, 2015 and 2016 respectively ($p < 0.05$). The weaning weights were of 29.02, 29.73 and 30.99 kg for the years 2014, 2015 and 2016 respectively ($p < 0.05$). The fleece weights were 2.28, 2.35 and 2.75 kg for the years 2014, 2015 and 2016 respectively ($p < 0.05$). The pregnancy percentages were of 68.33, 72.84 and 83.77 % in the years 2014, 2015 and 2016 respectively. The mortality percentages were 10.39, 5.11 and 2.44 % for the years 2014, 2015 and 2016 respectively ($p<0.05$). The set of technological alternatives applied during the years 2015 and 2016 had a significant effect on the birth weight, weaning weight, fleece weight, pregnancy percentage and mortality of the alpacas.

Resumen. El objetivo del estudio fue evaluar el efecto de las alternativas tecnológicas en la mitigación del cambio climático en la crianza de alpacas sobre los 4,000 msnm. El estudio de validación se realizó en 06 comunidades campesinas de dos zonas agroecológicas de la región Puno. Las variables en estudio fueron el peso al nacimiento, peso al destete, peso de vellón, porcentaje de preñez y mortalidad, durante el año 2014 en el que no se aplicaron alternativas tecnológicas, en tanto que en los años 2015 y 2016 se aplicaron este conjunto de alternativas. Los datos se analizaron en un diseño completamente al azar mediante el programa estadístico SAS versión 9.4. Los resultados muestran que los pesos al nacimiento fueron de 6.01, 6.254 y 6.83 kg para los años 2014, 2015 y 2016 respectivamente ($p<0.05$). Los pesos al destete fueron de 29.02, 29.73 y 30.99 kg para los años 2014, 2015 y 2016 respectivamente ($p<0.05$). Los pesos vellones fueron de 2.28, 2.35 y 2.75 kg para los años 2014, 2015 y 2016 respectivamente ($p<0.05$). Los porcentajes de preñez fueron de 68.33, 72.84 y 83.77 % en los años 2014, 2015 y 2016 respectivamente. Los porcentajes de mortalidad fueron 10.39, 5.11 y 2.44 % para los años 2014, 2015 y 2016 respectivamente ($p<0.05$). El conjunto de las alternativas tecnológicas aplicadas durante los años 2015 y

2016 tuvieron un efecto significativo sobre el peso al nacimiento, peso al destete, peso vellón, porcentaje de preñez y mortalidad de las alpacas.

Keywords: alpaca, technological alternatives, climate change

Introduction

The CSA have played a fundamental role in the development of Andean societies from the old hunter communities to the current peasant communities (Mengoni, 2008). Before colonization domestic camelids were widely distributed from the altitudes of the Andes to sea level. During the colonization they suffered the uncontrolled sacrifice and were displaced by the domestic animals introduced by the Europeans. This fact remains a clear example of ecological imperialism (Crosby, 1986). As a consequence, both domestic and wild CSAs suffered a severe reduction in number and their geographic distribution was drastically affected, being reduced to the altitudes of the Andean highlands (Wheeler et al., 1995). The CSA have the advantage of resisting adverse environments such as the one existing in the Andean highlands. It is estimated that there are about seven million CSAs in the Andean countries: Argentina, Bolivia, Chile, Colombia, Ecuador, Paraguay and Peru (Fernández Baca, 2005, Raggi, 2005). Of these CSA, 51 % are in Peru and 34 % in Bolivia. Only in Peru are the four species of CSA, being this country which houses the largest population of alpacas and vicuñas. The largest population of llamas is found in Bolivia and guanacos in Argentina. Interest in llamas and alpacas has increased in recent years in other countries including the United States, Canada, Australia, New Zealand and some European countries such as the United Kingdom, Germany, Italy and France (Brown, 2000; Sharpe et al., 2009). The objective of the study was to evaluate the effect of technological alternatives in the mitigation of climate change in the breeding of alpacas over 4,000 meters above sea level.

Materials and Methods

The study was conducted in eight rural communities of the department of Puno located above 4,000 meters above sea level in the agro-ecological zones of dry puna and humid puna. The data for the analysis comes from the records of calving, weaning, shearing, controlled enumeration and health, these were analyzed in a completely randomized design using the statistical software SAS version 9.4. The Duncan test was used for multiple comparisons with a level of significance of $\alpha = 0.05$.

Results and Discussion

Table 1 shows the productive indices of three consecutive years, taking the year 2014 as a reference, as the year in which the technologies were not applied. The results show that the birth weights were of 6.01, 6.254 and 6.83 kg for the years 2014, 2015 and 2016 respectively ($p<0.05$). The weaning weights were of 29.02, 29.73 and 30.99 kg for the years 2014, 2015 and 2016 respectively ($p<0.05$). The fleece weights were 2.28, 2.35 and 2.75 kg for the years 2014, 2015 and 2016 respectively ($p<0.05$). The pregnancy percentages were of 68.33, 72.84 and 83.77 % in the years 2014, 2015 and 2016 respectively. The mortality percentages were 10.39, 5.11 and 2.44 % for the years 2014, 2015 and 2016 respectively ($p<0.05$). It is possible to observe that the effect of the application of technologies allowed to increase the weight at birth, weight at weaning, weight of fleece, also allowed to increase the pregnancy rate and decrease the percentage of mortality of the alpacas.

Table 1: Alpacas' productive indices according to production year

Year of Production	Weight at birth kg	Weight at weaning kg	Weight of fleece kg	Pregnancy %	Mortality %
2014	6.01 ± 1.36^{c}	29.02 ± 6.67^{b}	2.28 ± 0.62^{b}	68.33	10.39
2015	6.25 ± 1.27^{b}	29.73 ± 5.98^{a}	2.35 ± 0.65^{b}	72.84	5.11
2016	6.83 ± 1.21^{a}	30.99 ± 6.12^{a}	2.75 ± 0.59^{a}	83.77	2.44

^{abc} Significant differences between means within column, $p<0.05$

Conclusion

The application of technologies contributes to mitigate the effects of climate change at the level of peasant communities above 4,000 msnm, we observe the increase in weight at birth, weight at weaning, weight of fleece, pregnancy percentage and decrease in percentage of mortality of the alpacas.

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