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Growth intensity of lambs from native sheep breeds in Albania

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Abstract: The aim of the study was to evaluate the influence of breed and sex on the body weight at different ages from birth to weaning and to compare with exotic ones. The data of live body weight at birth, 30 days, 60 days and weaning time were collected from a total of 180 lambs from two native sheep breeds namely Shkodrane and Lara e Polisit and two imported breeds Awassi and Il de France that are reared in the farm of the Center of Agricultural Technology Transfer of Korca region located in South East of Albania. All the lambs were from a single litter size. The mean body weight at birth was 3.3065 ± 0.307 kg, 7.847 ± 1.979 kg at the age of 30 days, 8.296 ± 2.015at 60 daysand 9.9161 ± 3.188 kg at weaning time of lambs of Shkodrane breed. The mean body weight of Lara e Polisit breed was 3.2500 ± 0.481 kg at birth, 8.9963 ± 2.565 kg at age 30days, 9.045 ± 2.155at 60 days and 10.1857 ± 3.078 kg at weaning time. The average birth weight of lambs from both imported breeds was 37.41% higher than that of both native breeds.The imported breeds have higher body weights at all post natal stages compared to the native breeds and the differences were highly significant ($p<0.0001$).Body weight at different ages until weaning was significantly affected by the breed effect ($p<0.0001$). The difference in the body weight of male and female lambs were significantonly at the age of 30 days ($p<0.05$). Average daily gains from birth to weaning time of lambs were 0.0782 kg and 0.085 kg for Shkodrane e Lara e Polisit, respectively.

Keywords: Body weight, Breed effect, Sex effect, Daily gain

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1 Introduction

Sheep breeding in Albania has been practiced since time immemorial, as a fundamental activity for livelihoods. Albania has different Geo-climatic conditions that have developed a diversity of bio-climatic ecosystems characterized by high biodiversity and the creation of abundant genetic funds. Nowadays sheep are one of the most important livestock species.

There are farmed around 1.55 million heads of sheep in Albania where 75.39 % of the total herd are milked sheep. They serve as a good source of milk and dairy products, as well as meat. The main sheep breeds are native ones reared in an extensive system, especially in hilly and mountainous regions. The local sheep breeds have a very good adaptation to the environment and the hard conditions of their breeding (Leka, 2019). Their phenotypic characteristics and productive traits differ, and this is used by farmers to produce a variety of milk products and meat that are serving as a good base for agrotourism development in rural and remote areas. Exotic sheep breeds have been imported into Albania in efforts to increase the milk and meat production from sheep, through intensive upgrading and crossbreeding.

Consequently, the Albanian native/ autochthonous genetic fund of sheep breeds has been significantly decreased (Kume, 2019). Two important Albanian native sheep breeds are Shkodrane and Lara e Polisit. The Shkodrane sheep breed is a unique autochthonous breed reared in North Albania (Shkodra region) and belongs to the long tail group of a triple purpose use. Shkodrane is a small sheep, well adapted to poor and stony pastures and the harsh climate of North Albania. The very long and coarse wool is typical for this breed used mostly for mattress filling. Nowadays wool production has no more economic value, and the interest of farmers to keep this breed is diminishing. Lara e Polisit is a local breed that is raised in the central part of Albania. It is a general-purpose breed with a white face and legs with black marks, especially spectacles (Hoda et al., 2022). They are noted for their milk production. The population size is decreasing and it is a critically endangered breed (Leka, 2019).

The genetic diversity of some native sheep breeds is estimated by different molecular markers (Hoda et al., 2009; Hoda et al., 2011). The breeds that are currently under this study are previously characterized based on morphometric indices and measurements (Hoda et al., 2022).

To preserve this genetic fund, a representative number of two native breeds are reared to an *ex-situ, in-vivo* conservation center where are kept also two exotic breeds Awassi and Il De France.

Besides milk production, farmers make profits from meat production also, selling lambs after weaning time. So the growing intensity of lambs is important to improve the efficiency of sheep farming. There are many factors that influence the growth of the animals and the most important are breed, sex, litter size, age of mother, nutrition and breeding management (Janos et al., 2018). The control of the live weight of lambs at an early age at specific periods of time, can very accurately characterize the intensity of growth (Panayotov et al., 2018). It is important to have an efficient growth rate in preweaning stage. Monitoring the growth rate by weighing lambs several times after birth and at weaning can help to know if the lambs are nursed properly, and to make adjustments of ewe nutrition for better efficiency.

The aim of the study was to evaluate the influence of breed and sex on the body weight at

different ages from birth to weaning and to compare with exotic ones. Exploring the growing capacities of native breed lambs will serve to optimize the management and improve the efficiency of birth to weaning period.

2 Materials and Methods

The current study was performed in four sheep breeds that are reared at the Center of Agricultural Technology Transfer (CATT), which is located in the South East region of Albania. The native breeds are Shkodrane and Lara e Polisit and the imported breeds are Il de France and Awassi. The records of body weight of 180 animals belonging to four sheep breeds were collected. Data were recorded from 31 individuals from Shkodrane breed, 28 from Lara e Polisit, 76 from Awassi and 45 from Il de France. The weighting time of each animal was performed each month from birth till weaning time. The weighting was done with electronic balance with accuracy of 0.01 kg. All lambs were from single litter sizes. The lambs were born during December 2021-to January 2022.

The data were analysed by software package IBM SPSS Statistics 20 and the XLSTAT software (Data Analysis and Statistical Solution for Microsoft Excel, Addinsoft, Paris, France 2017). Descriptive results were presented as mean and standard deviation (SD). Daily weight gain for each age and weight gain at weaning were calculated.

3 Results and Discussions

Birth weight is an economically important growth trait in sheep meat production as it is highly correlated to the future weight up until weaning (Assan, 2020). The same author reports that birth weight and weaning weight are highly correlated, hence they equally predict the overall post weaning growth performance and carcass performance. The live weight is a parameter of growth performance of lambs from all production types (Simeonov and Pamukova, 2017).

Figure 1 displays the Box plot of body weight at different ages of all four breeds. The birth weight of Shkodrane lambs ranged from 3.00 to 4.00 kg with an average value of 3.306 kg. The average birth weight of Lara e Polisit lambs was 3.250 kg which is slightly lower (0.056 kg) than Shkodrane lambs. It ranges from 2.00 to 4.00 kg. The differences between these two breeds were not significant ($p=0.590$). The average birth weight of Awassi and Il de France lambs was 3.836 kg and 3.967 kg, respectively and the differences were not significant ($p=0.269$).

Analysis of Variance showed that 20.8% of the variation of birth weights is explained with the breed effect. The average birth weight of lambs from both imported breeds was 37.41% higher than that of both native breeds and the differences between imported and native breeds were highly significant ($p<0.0001$).

The lowest average body weight at 30 days of age was found in Shkodrane lambs (7.847 kg) and the highest value was found in Awassi lambs (11.471kg).At the level of the whole sheep population, the body weights of lambs at 30 days was affected significantly ($p<0.0001$) by the

breed. Based on ANOVA analysis, it was found that 32.2% of the variation was due to the breed effect.

The average body weights of Shkodrane, Lara e Polisit, Il de France and Awassi lambs at 60 days were 8.296 kg, 9.045 kg, 14.687 kg, and 18.520 kg respectively. Awassi lambs displayed the higher body weight, meanwhile, Shkodrane lambs displayed the lower body weight. ANOVA indicated significant differences between breeds at this age (table 1). About 44% of the variation of body weight at 60 days is explained by the effect of breed.

Weaning weights were 9.916, 10.185, 20.562 and 19.803 kg at Shkodrane, Lara e Polisit, Il de France and Awassi respectively, and these differences were highly significant ($p<0.0001$) (Table 1). About 31.9% of the variation is explained by the breed effect. A significant effect of breed on body weights of lambs at different ages was found by Momani Shaker et al. (2002) (Momani Shaker et al., 2002).

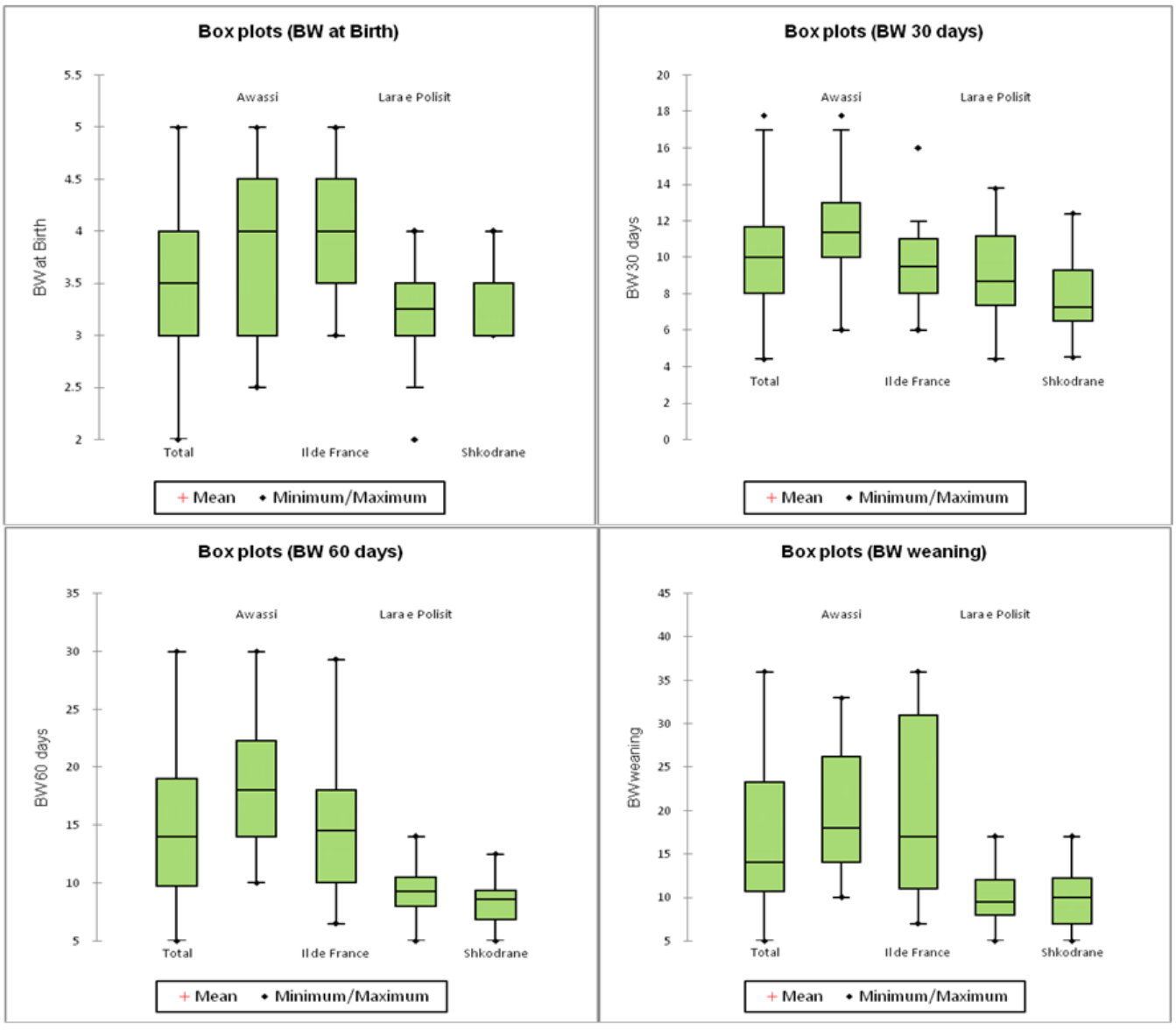

Figure 1. Body weight of lambs at different ages

Table 1. Breed effect at body weight at different ages

	BW at Birth	BW 30 days	BW 60 days	BW weaning
R^2	0.208186	0.312434	0.439863	0.318626
F	14.28544	24.68942	42.6667	25.40748
Pr > F	<0.0001	<0.0001	<0.0001	<0.0001

Table 2 shows the intensity of growth of lambs from four different breeds at birth and 30, 60 days of age and the weaning period. All breeds have a very intensive growth till 30 days of life, where the two imported breeds displayed a greater growth intensity.

Table 2. Means, standard deviation for average weight gain and average daily weight gain from birth to 30, 60 days and to weaning

Statistic	Growth	Average Daily Gain
Breed		
0- 30 days	**6.194±2.634**	**0.206±0.088**
Awassi	7.636±2.292	0.255±0.077
Il de France	5.349±1.785	0.179±0.06
Lara e Polisit	5.7375±2.822	0.191±0.095
Shkodrane	4.288±2.305	0.141±0.077
0 - 60 days	**11.060±6.847**	**0.184±0.115**
Awassi	14.685±5.211	0.245±0.087
Il de France	10.720±5.085	0.179±0.085
Lara e Polisit	5.841±4.281	0.097±0.072
Shkodrane	5.004±3.943	0.083±0.066
0 - Weaning	**13.107±8.206**	**0.177±0.107**
Awassi	15.967±6.662	0.238 ± 0.097
Il de France	16.595±10.255	0.198±0.103
Lara e Polisit	6.935±3.018	0.085±0.025
Shkodrane	6.609±3.208	0.078±0.029
Sex		
0- 30 days	**6.195±2.551**	**0.207±0.086**
Female	5.918±2.171	0.198±0.073
Male	6.495±2.877	0.217±0.097
0 - 60 days	**11.06±5.954**	**0.185±0.1**
Female	10.569±5.741	0.177±0.096
Male	11.663±6.152	0.195±0.103

The highest average daily gain (ADG) until 30 days of age was found in Awassi (0.255±0.077) and the lowest was found in Shkodrane (0.141±0.077) (Table 2). Similar results are found also for the ADG at 60 days. The results showed that during 30 days the lambs had realized an average 6.144 kg absolute gain and 0.206 kg ADG.

The average weight gain at 60 days was 11.060 kg and the ADG 0.184 kg. According to

Janoš et al. (2018) and Hrouz and Šubrt (2007) growth intensity of lambs in their first weeks of life depends on the amount and quality of breast milk (Janoš et al., 2018; Hrouz and Šubrt, 2007). Our results indicate that the ewes of Lara e Polisit breed were characterized by higher milk production compared to Shkodrane.

The results showed that during the period from birth to weaning the lambs had a good intensity of growth, and as a result they had realized an average 6.609 kg absolute gain and 6.935 kg in Shkodrane and Lara e Polisit respectively, 15.967 kg and 16.595 kg in Awassi and Il de France.

Average daily gain from birth to weaning period in Shkodrane breed was 0.078 kg and with a growth intensity of approximately 199%. In Lara e Polisit the average daily gain was 0.085 kg and the intensity of growth 213%. In Awassi the average daily gain was 0.238 kg and the intensity of growth was approximately 421%. In Il de France, average daily gain was 0.198 kg and with a growth intensity of 418%.

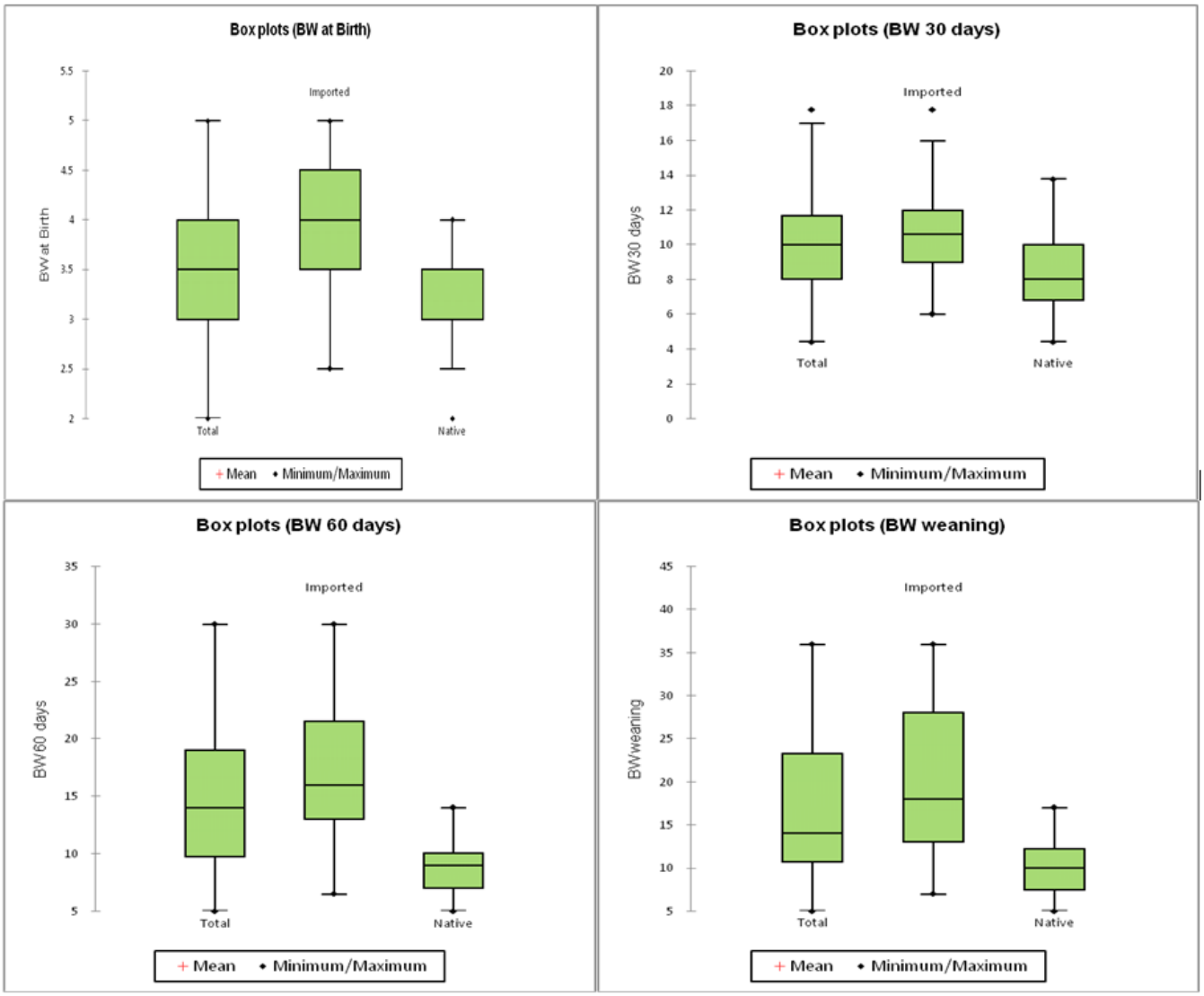

Figure 2. Body weight of native and imported lambs

The weight gain at 30 days were 4.4033 ± 0.385 kg and 5.737±0.461 kg in Shkodrane and Lara e Polisit respectively. During the second month, the weight gain was lower compared to the first month, with an average of 2.167 ± 0.556 kg in Lara e Polisit and 1.122 ± 0.5798 kg in Shkodrane. Each of the imported breeds Awassi and Il deFrance, displayed a higher weight gain for the period from 30 days to weaning time.

Body weight at birth for the imported breed was 3.884 ± 0.626 kg and for native breed 3.280 ± 0.393 kg. At weaning period, the average body weight for the imported breeds was 20.085 ± 8.181 and for the native breeds 10.044 ± 3.086 kg. The high difference at weaning period is explained by the high intensity of growth of imported breed. Imported breeds have higher body weight at all different stages of life compared to native breed and the difference is highly significant ($p<0.0001$). Figure 2 displays the Box plot of body weight at different ages for native and imported breeds.

The average birth weight and weights at age of 30 and 60 days were higher in males than female lambs. But this difference is statistically significant only for the weight at 30 days ($p<0.05$). R=0.028, so 2.8% of variation in weight is explained by the factor sex, which is a very small value.

Table 3. Effect of sex on body weight at different ages

	BW at Birth	BW 30 days	BW 60 days	BW weaning
R^2	0.005153	0.0284804	0.009139	6.13497
F	0.85461	4.8370243	1.521841	0.010123329
Pr > F	0.357	0.029	0.219	0.920

According to Abbas et al. (2010) sex is the cause for males being heavier than females at all ages in the course of skeletal development (Abbas et al., 2010). The higher live weight of males might be attributed to the higher average daily weight gain (Macit et al., 2002). OjohMomoh et al. (2013) who studied two native sheep in Nigeria, Janos et al. (2018), Kuchtík and Dobeš (2006) indicated that males are born with higher weight and reach a higher growth intensity in the postnatal period. The effect of sex on body weight seems to be contradictory based on the findings of different authors (OjohMomoh et al., 2013; Janos et al., 2018; Kuchtík and Dobeš, 2006). Idris et al. (2010) found in the desert ewes that the female lambs were born with lower live weight than males, but later on first six weeks of lactation the females have heavier weights than male lambs (Idris et al., 2010). Panayotov et al. (2018) and Mohammadi et al. (2010) found no significant differences in the live weight of male and female lambs (Panayotov et al., 2018; Mohammadi et al., 2010).

Hozáková et al. (2019) suggest that the positive relationship between growth traits and live weight at maturity favourably affects the weight gains and therefore the amount of muscular tissue (Hozáková et al., 2019). Ahmad et al. (2021) found a high correlation of body weight of lambs at weaning with all subsequent traits, which can be exploited in breeding programs by employing indirect selection. The monitoring and improving the growth rate inpost-natal period of lambs will result in higher live weight at slaughteringas well as at mating period. The

selections practices that are being implemented at CATT tend to improve the growth rate of our native breeds in order to increase incomes of farmers from lambs sold for meat (Ahmad et al., 2021) Taye et al. (2010) suggest that efforts geared towards planned breeding, improved nutrition and health would assist farmers to exploit these native and adaptable sheep genetic resources efficiently (Taye et al., 2010).

The monitoring of growth rate in young animals helps in the improvement of the growth with the aim to improve the live weight at mating period. The results from the present study might contribute in the designing of breeding plans for the improvement of body weight traits in the native sheep breeds that are reared in the CATTr. This is very important since both native sheep breeds have the status of endagerous breeds. These breeds represent a valuable reservoir of genetic resources that might be conserved through increasing the economic interest of the farmers.

4 Conclusion

Shkodrane and Lara e Polisit are two important native breeds that have been declared at risk of extinction status. Both breeds displayed a growth rate typical as all the native breeds, which is lower than the rate of imported breeds raised at the same conditions.

The study indicated no statistical differences between two native breeds regarding the live weight at different ages and average daily gain weight as well. The results provided in this study can be considered for the designing of the conservation and breeding programmes.

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Conflict of interests

The authors declare that they have no competing interests.

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