The influence of prior experience on dietary diversity in sheep

Mariana Pedernera[1], Alejandra Vulliez[2] and Juan J. Villalba[3]

[1]Universidad Autónoma del Estado de Morelos, Morelos, México. [2]Universidad de la Republica, Montevideo, Uruguay. [3]Utah State University, Logan, Utah, USA.

ASAS-CSAS-WSASAS Virtual Annual Meeting & Trade Show
July 19-23, 2020

Introduction

- Ruminants learn about the post-ingestive characteristics of foods through individual and social experiences.
- Ruminants are able to build a balanced diet from arrays of different foods present in diverse plant communities.
- Negative experiences with novel foods have the potential to reduce dietary breadth because animals may become risk-averse after the consistent exposure to new experiences that promote food aversions such as those triggered by plant toxins.
- On the contrary, positive experiences with novel foods have the potential to enhance dietary breadth as animals may become risk-prone after the consistent exposure to nutritious foods.

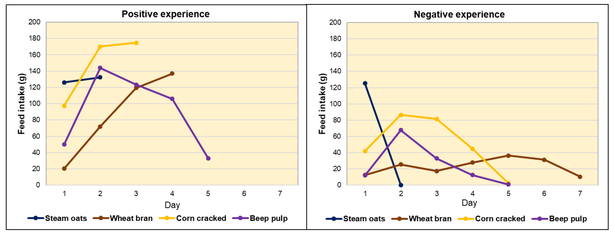

Figure 1. Daily intake of nutritious novel feeds by 2 groups of lambs during Exposure. Animals received an intraruminal infusion of LiCl (Negative experience; NE) or vehicle (water; PE) upon ingestion of > 50 g of the novel feed.

Aim of the Study

Explore the influence of prior dietary experiences on intake and selection of novel feeds by lambs

Table 1. Intake of novel feeds by two groups of lambs after being conditioned with intraruminal infusions of LiCl (negative experiences; NE) or vehicle (positive experiences; PE) upon ingestion of nutritious feeds.

Intake	PE(g)	NE (g)	*P* value
Calfmana®	124.1 ± 16.72	31.45 ± 12.73	<0.001
Rice bran	65.7 ± 11.2	28.4 ± 11.47	<0.001
Sorghum	160.2 ± 13.36	36.15 ± 13.62	<0.001
Soy bean meal	105.1 ± 14.05	61.5 ± 14.45	0.017

Methodology

- Twenty lambs, housed in individual pens, were assigned to two groups (10 lambs/group): Negative (NE) and Positive (PE) experience.
- **Exposure:** Lambs were offered a nutritive novel feed per week (oats, wheat bran, corn and beep pulp) followed by intra-ruminal infusions of lithium chloride-LiCl (150 mg/kg BW), a toxicant that causes food aversions (Group NE), or vehicle (water) (Group PE) once they ate ≥ 50g of the novel feed.
- **Neophobic test:** After exposure, all lambs were tested for their acceptance of single novel feeds, each offered during 2 consecutive days: sorghum grain, rice bran, Calfmanna® pellets and soybean meal. Subsequently, all lambs were offered a 5-way choice among these feeds and alfalfa (familiar feed).
- Intake data, preference and Shannon's diversity index (5-way choices) were evaluated an analyzed (Mann-Whiney U test)

Table 2. Intake by 2 groups of lambs offered 5-way choices among 4 novel feeds and alfalfa, a familiar feed. Groups were previously conditioned with intraruminal infusions of LiCl (negative experiences; NE) or vehicle (positive experiences; PE) upon ingestion of nutritious feeds.

Intake	PE (g)	NE (g)	*P* value
Alfalfa pellets	549.1 ± 51.89	525.8 ± 44.24	0.832
Calfmana®	164.3 ± 8.712	50.06 ± 11.08	<0.001
Rice bran	105.3 ± 9.83	84.5 ± 10.31	0.008
Sorghum	146.3 ± 11.14	80.24 ± 12.53	0.002
Soy bean meal	112.3 ± 11.62	91.52 ± 11.57	0.277
Index *	1.244 ± 0.03	0.845 ± 0.05	<0.001

*Shannon's diversity index

Conclusion

Prior experience influenced neophobia and dietary diversity, as lambs conditioned with LiCl became more neophobic and selected a less diverse diet. This behavior could impact the nutrition and welfare of grazing animals introduced to novel environments and the diversity of plant communities.

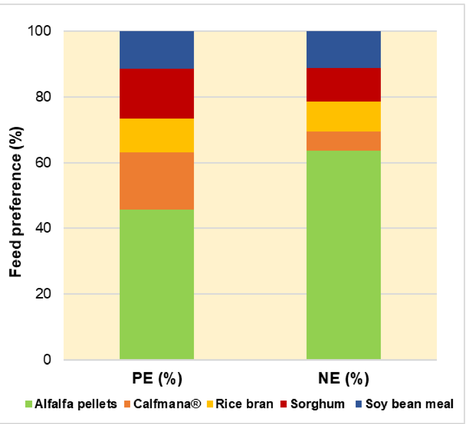

Figure 2. Preference by 2 groups of lambs offered 5-way choices among 4 novel feeds and alfalfa, a familiar feed. Groups were previously conditioned with intraruminal infusions of LiCl (negative experiences; NE) or vehicle (positive experiences; PE) upon ingestion of different nutritious novel feeds.

Bibliography

Launchbaugh, K. L., et al. (1997). Overcoming food neophobia in domestic ruminants through addition of a familiar flavor and repeated exposure to novel foods. Applied Animal Behaviour Science, 54(4), 327-334. // **Pacífico da Silva and Soto-Blanco, B. (2010).** Conditioning taste aversion to Mascagnia rigida (Malpighiaceae) in sheep. Research in Veterinary Science, 88(2), 239-241. // **Villalba, J. J., et al. (2012).** Relationships between early experience to dietary diversity, acceptance of novel flavors, and open field behavior in sheep. Physiology & Behavior, 105(2), 181-187. // **Provenza, F. D. (1995).** Postingestive feedback as an elementary determinant of food preference and intake in ruminants. Rangeland Ecology & Management/Journal of Range Management Archives, 48(1), 2-17.