ANS 490-A: Ewe Lamb's Temperament and Effects on Maze Entry, Exit Order and Coping Styles When Exposed to Novel Stimulus

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Summary

The objectives of this experiment were (1) to determine if experience affects maze entrance and exit order and (2) how temperament affects ewe lamb coping response to a predictable novel stimulus. A total of nine, ~4-month-old blackface Hampshire-cross ewe lambs, BW~18 to 27 kg were used. Ewe lamb temperament was identified and three groups of ewe lambs were created. Each group had a ***BOLD***, ***MODERATE*** and ***SHY*** ewe lamb. All ewe lambs were introduced and habituated to the maze for four consecutive days (days -3 to day 0), respectively. On trial day 1, Group 1 (***EXPERIENCED***) passed through the maze. On trial day 2, Groups 1 and 2 (***MIDDLE***) passed through the maze. On trial day 3, Groups 1, 2 and 3 (***NAÏVE***) passed through the maze. Over these trial days, ewe lambs were exposed to a red ball and a red flag (novel stimuli). Behavioral measures (order to enter and exit the maze and coping style [active vs passive]) were collected over four habituation days (-3, -2, -1 and 0), and over three trial days (1, 2 and 3), respectively. The data will be presented descriptively. Ewe lamb 1936 had the highest number of cone touches, with 1943 having the least over the 1-h observation period. For the ***BOLD*** group the cone touches ranged from 7 to 10, ***MODERATE*** ranged from 5 to 6 and ***SHY*** ranged from 0 to 4 respectively. Over all entry days a ***BOLD*** ewe lamb entered and exited the maze first, but it was not always the same ***BOLD*** ewe lamb. There was no consistent ewe lamb order for entering or exiting the maze for ***MODERATE*** or ***SHY*** temperament classification. Ewe lambs for both stimuli engaged in a passive coping style (77.8%). In conclusion, ewe lambs, regardless of temperament, did not react negatively to a novel stimuli. Furthermore, experience to the maze did not affect entrance and exit order and all ewe lambs navigated the maze in less than 15-seconds over all trial days. We predict that this behavioral reactivity would enable producers to handle ewe lambs effectively in a handling system for necessary husbandry practices without undue animal welfare issues.

Introduction

Fear, anxiety, and stress are affective states observed in cattle, swine, poultry, and sheep. An animal can react in three ways when placed in a novel or unfamiliar environment: 1) fear, 2) flight or 3) freeze. Animal fear can be tested using many methodologies. These methodologies can differ to include, for example, the number of animals being tested, the type of testing arena and the novel stimuli used. During fear tests, behavior is often measured to determine how fearful a prescribed set of circumstances are. Primary behavioral indicators of fear include active defense reactions such as attack and threaten, active avoidance reactions such as hiding and escaping, and movement inhibition. Activity level often is dependent on the emotional intensity of the threat. During a low threat, such as those presented by fear tests, increased activity has been concluded to indicate a fearful animal. Sheep are flock animals and communicate using a multi-modal approach. However, how experienced sheep communicate with naïve sheep to a predicable novel/fear eliciting stimuli is unknown. Therefore, the objectives of this experiment were (1) to determine if experience affects maze entrance and exit order and (2) how temperament affects ewe lamb coping response to a predictable novel stimulus.

Materials and Methods

Animals and housing: A total of nine, ~4-month-old blackface Hampshire-cross ewe lambs, BW~18 to 27 kg were used. Ewe lambs were housed at the ISU Sheep Farm. The home pen measured 10.5 m W by 7.5 m L. The floor was packed dirt with a 5 cm covering of straw. Water was provided *ad libitum* through a small trough (1.3 cm L by 1.1 cm H) and was checked twice daily by farm staff. The ISU IACUC committee approved the animal protocol.

Identification of ewe lamb temperament*:** Ewe lambs were tested in their home pen with an orange traffic cone on day -4. The orange traffic cone was situated centrally in the home pen. The observer stood still in the alleyway, and continuously watched the ewe lambs between 09:00 and 10:00 (immediately after morning feeding). The number of cone touches for each ewe lamb was recorded. At the conclusion of the 1-h testing session, data was tallied and ewe lambs were ranked highest to lowest for the number of times they touched the cone. This methodology was based on previous work conducted by Remseyer and colleagues (2009). Based on the ranking, ewe lambs 1 to 3 (highest cone touches) were ranked as ***BOLD, ewe lambs 4 to 6

(middle cone touches) were ranked as ***MODERATE*** and ewe lambs 7 to 9 (lowest cone touches) were ranked as ***SHY***.

Treatments: From the temperament testing, three groups of ewe lambs were created. Each group had a ***BOLD***, ***MODERATE*** and ***SHY*** ewe lamb. Each ewe lamb had a colored symbol placed onto their back using an animal safe crayon the day before habituation to the maze for individual identification.

Maze: The maze was a two-corner maze and had a holding pen at the maze entrance (Figure 1).

Habituation of ewe lambs to the maze: All ewe lambs were introduced and habituated to the maze for four consecutive days (days -3 to day 0), respectively. The length of habituation follows previously published methodology by Erhad and collegaues (2005). Testing was done at 08:00. Prior to the ewe lambs entering the maze, 2 kg of sheep ration was trickled onto the maze ground. Ewe lambs were moved from their home pen and placed into the holding pen. A researcher maintained a crouched position and slid a paneled gate sideways to open up the maze. Upon exiting the maze, ewe lambs were offered their morning food ration (1.3 kg of feed/ewe lamb). At the completion of maze habituation, all ewe lambs were moved back to their home pen.

Exposure of ewe-lambs to the novel stimuli: On trial day 1, Group 1 (***EXPERIENCED***) passed through the maze. On trial day 2, Groups 1 and 2 (***MIDDLE***) passed through the maze. On trial day 3, Groups 1, 2 and 3 (***NAÏVE***) passed through the maze.

Novel stimuli: At station 1, a red rubber ball was lowered quickly (~3 seconds) from the ceiling to the floor using a 3.5 m string. The ball was 0.9 m in diameter. At station 2, a cotton fabric red flag (33 cm W x 46 cm L) attached to a 31 cm pole was waved quickly (~4 forward and back motions) over the top of the maze. The researcher remained out of ewe lamb's view for both stimuli.

Behavioral methodology: Behavioral measures were collected over four habituation days (-3, -2, -1 and 0), and over three trial days (1, 2 and 3), respectively. Video was recorded using two 12 V color Close Circuit Television (CCTV) cameras (Model WV-CP484, Matsushita Co Ltd, Japan). Video was captured digitally using the Noldus portable lab (Noldus Information Technology, Wageningen, The Netherlands). Cameras were fed into a multiplexer, allowing the image to be recorded using a PC with HandiAvi (v4.3, Anderson's AZcendant Software, Tempe, AZ, USA) at 30 frames per second.
Behaviors and postures: Ewe lambs were filmed continually (Table 1).

Table 1. Ethogram adapted from Greiveldinger and colleagues (2007; 2009)

Measure	Definition
Order to enter the maze	Ewe lamb hind legs stepping away from the holding pen into zone 1.
Order to exit the maze	Ewe lamb hind legs stepping out of zone 3 and back into the home pen.
Active coping	Ewe lamb running / leaping towards the stimuli.
Passive coping	Ewe lamb pausing (≥3 seconds) and then reacting by running / leaping away the stimuli.

The Data will be presented descriptively.

Results and Discussion

Identification of ewe lamb's temperament: Ewe lamb 1936 had the highest number of cone touches, with 1943 having the least over the 1-h observation period. For the ***BOLD*** group the cone touches ranged from 7 to 10, ***MODERATE*** ranged from 5 to 6 and ***SHY*** ranged from 0 to 4 respectively (Table 2).

Table 2. Ewe lamb's temperament and group assignment

ID	Touches (n)	Temperament	Group
1936	10	***BOLD***	1
1939	5	***MODERATE***	1
1955	3	***SHY***	1
1963	9	***BOLD***	2
1960	5	***MODERATE***	2
1943	0	***SHY***	2
1931	7	***BOLD***	3
1968	6	***MODERATE***	3
1958	4	***SHY***	3

Entry order: Over all entry days a ***BOLD*** ewe lamb entered the maze first, but it was not always the same ***BOLD*** ewe lamb. There was no consistent ewe lamb order for ***MODERATE*** or ***SHY*** temperament classification, nor did ewe lambs move within their assigned group (experienced, middle or naïve; Table 3). Entry order may have been influenced by the order of the ewe lambs in the holding pen, however, due to different ewe lambs and groups entering first over the trial, we could rationalize that this entry order was random. However, this would be a useful measure to collect in future studies.

Exit order: Over five of the seven days a ***BOLD*** ewe lamb exited the maze first, but it was not always the same ***BOLD*** ewe lamb. There was no consistent ewe lamb order for ***MODERATE*** or ***SHY*** temperament classification, nor did ewe lambs move within their assigned group (experienced, middle or naïve; Table 3).

Coping style: Ewe lambs for both stimuli engaged in a passive coping style (84/108 exposures [77.8%]; Table 4). A passive coping style might be attributed to ewe lambs being a prey animal. This passive coping style allows the ewe lamb to briefly stop, cognitively process stimuli directional ability and act accordingly. Hence, we could hypothesize that such a coping style would result in a more successful survival outcome, than actively running and/or leaping towards the stimuli and potential danger.

Table 4. Coping style for ewe lambs when exposed to a ball or flag in the maze

	Active	Passive	Total
BALL			
BOLD	4	14	18
MODERATE	3	15	18
SHY	5	13	18
FLAG			
BOLD	4	14	18
MODERATE	3	15	18
SHY	5	13	18

Note; the flag and ball exposure began on day 1, 2 and 3 of the trial. On day 1, 3 ewe lambs (Group 1) were exposed. On day 2, 6 ewe lambs were exposed (Groups 1 and 2). Day 3, 9 ewe lambs were exposed (Groups 1 to 3). Hence the total number of ewe lamb exposures to the ball and flag was 18.

In conclusion, ewe lambs, regardless of temperament, did not react negatively (escape attempts from maze or charging stimuli) to a novel stimuli. Furthermore, experience to the maze did not affect entrance and exit order and all ewe lambs navigated the maze in less than 15 seconds over all trial days. We predict that this behavioral reactivity would enable producers to handle ewe lambs effectively in a handling system for necessary husbandry practices without undue animal welfare issues.

Acknowledgements

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Figure 1. Schematic of the maze.

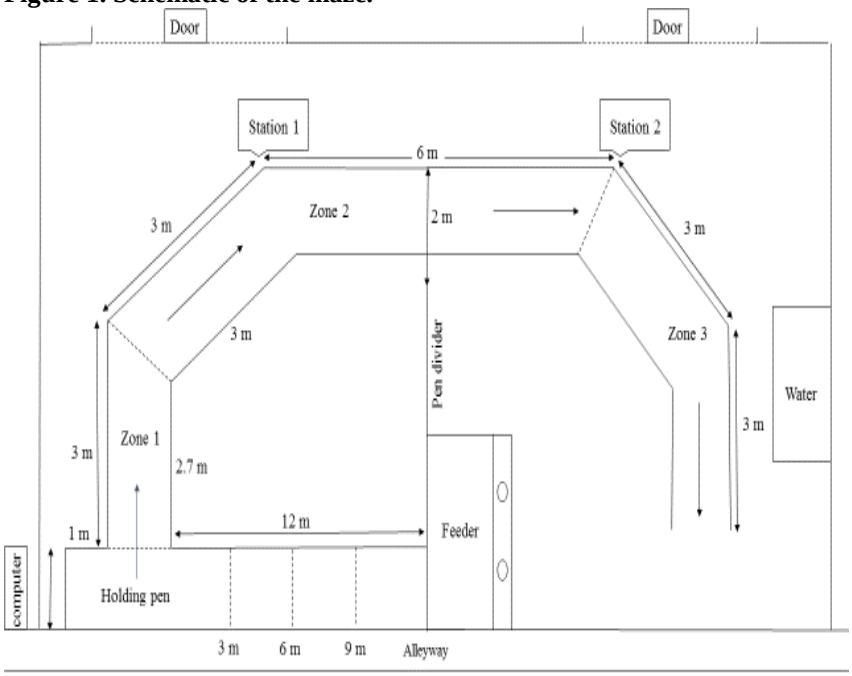

Table 3. Entry and exit order by ewe-lambs into the maze over the trial days. Yellow (Group 1), Grey (Group 2) and No color (Group 3)

	Day						
Order	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**
				Entry			
1	1936	1931	1931	1936	1936	1963	1963
2	1939	1943	1936	1931	1939	1960	1958
3	1963	1939	1939	1963	1955	1939	1955
4	1943	1936	1960	1955	.	1936	1943
5	1960	1955	1968	1943	.	1955	1939
6	1931	1958	1963	1939	.	1943	1968
7	1955	1963	1955	1960	.	.	1931
8	1958	1960	1958	1958	.	.	1960
9	1968	1968	1943	1968	.	.	1936
				Exit			
1	1943	1939	1963	1963	1936	1963	1963
2	1936	1943	1936	1931	1939	1960	1955
3	1955	1936	1958	1936	1955	1939	1931
4	1939	1955	1960	1955	.	1936	1936
5	1960	1958	1939	1960	.	1955	1960
6	1968	1931	1955	1939	.	1943	1958
7	1958	1960	1931	1958	.	.	1968
8	1931	1968	1943	1968	.	.	1943
9	1963	1963	1968	1943	.	.	1939

Note: Over treatment day 1 Group 2 and 3 were not moved through the maze
On treatment day 2 Group 3 was not moved through the maze