EFFECTS OF PASTURE VS. DRYLOT FLUSHING ON EWE BODY WEIGHT CHANGE AND NUMBER OF LAMBS BORN

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Impact Statement

In the current study, flushing environment did not have an impact on number of lambs born (NLB). Average daily gain and final body weight also did not impact NLB. In non-extreme weather conditions, it may be more economical for livestock producers to flush ewes on pasture alone, or on a poor quality pasture with supplementation vs. confining ewes and providing full feed. As an alternative to flushing ewes immediately prior to breeding, it may be possible for producers to flush ewes on pasture earlier in the season, when forage nutrient quality is higher, and still experience a flushing effect. However, long-term studies are needed to assess the relationship between flushing and the length of time between nutritional influence, breeding, and number of lambs born.

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SUMMARY

Flushing is the practice of increasing nutrient intake before and during breeding in order to increase ovulation and ultimately the number of lambs born (**N**LB). Two flushing trials were conducted to evaluate NLB per ewe, and BW gain of ewes receiving 1 of 3 treatments: 1) ad libitum access to pea-barley hay in drylot (DRY), 2) ad libitum access to swathed pea-barley forage in paddocks (PAD), and 3) ad libitum access to swathed spring wheat straw in paddocks with 0.45 kg of supplement$\cdot$ewe$^{-1}\cdot$d^{-1} (WHT). Feeding treatments did not influence ADG, final BW, lambing date, or NLB in our study, suggesting cost-saving benefits for sheep producers using swath grazing flushing practices. Similar responses by ewes to feeding treatments suggest swath grazing as a viable flushing strategy to reduce inputs while maintaining high productivity.

INTRODUCTION

Flushing, the practice of increasing nutrient intake before and during breeding to increase ovulation and the number of lambs born, is commonly used to increase reproductive performance of ewes (NRC, 2007).

Despite reported benefits of flushing on ewe productivity, little information exists on how feeding conditions and environment influence its efficacy. Flushing ewes with forage in a confinement system is time and labor intensive requiring the baling and hauling of hay. An alternative approach that may reduce feeding costs is flushing ewes on cut forage left in swaths in the field. Nevertheless, reproductive benefits accrued from flushing may be reduced if swath-grazing results in reduced gains in body weight and lower fecundity compared to confinement flushing.

PROCEDURES

All animal procedures were approved by the Montana State University Agricultural Animal Care and Use Committee (Protocol #2009-AA04).

This study was conducted at Montana State University's Fort Ellis Experiment Station near Bozeman, MT.

Sheep Selection and Management. In 2010 (Trial 1), 90 yearling Targhee ewes (average BW = 65.4 ± 5.8 kg, non-pregnant, non-lactating, 18 mo of age) were transported from the Bair Ranch in Martinsdale, MT on September 25 (d 0) to Montana State University's Fort Ellis Experiment Station near Bozeman, MT. In 2011 (Trial 2), 60 mature Rambouillet ewes (BW = 61.9 ± 6.3 kg BW, non-pregnant, non-lactating, 3.3 + 0.48 yr of age) from the Red Bluff Research Ranch near Norris, MT, were transported on September 6, 2011 (d 0) to the Fort Ellis Experiment Station. Ewes in both trials were fasted for 24 to 48 h before arrival to reduce effects of gut fill on initial body weight. Ewes were paint-branded or ear-tagged for identification purposes and fasted weights

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were recorded. Ewes had ad libitum access to treatment forage, water, and a salt and mineral supplement. All treatments were formulated to be isonitrogenous and isocaloric meeting or exceeding NRC (2007) recommendations for ewes at flushing and gaining 0.10 kg/d.

Trial 1. Upon arrival at Fort Ellis on d 0, groups of 10 yearling ewes were randomly allocated to 1 of 3 treatments: 1) ad libitum access to pea-barley hay in drylot (DRY), 2) ad libitum access to swathed and standing pea-barley forage in paddocks (PAD), and 3) ad libitum access to swathed and standing spring wheat straw stubble in paddocks plus 0.45 kg of an 18.9% CP supplement·ewe^{-1}·d^{-1} (WHT). Drylot pens measured 40 m × 12 m and swath grazing paddocks measured 91 m × 15 m for PAD and 91 m × 50 m for WHT. Intense grazing of spring wheat stubble by ewes caused forage to become scarce. Therefore ewes were supplemented with additional wheat straw in the WHT treatment on d 21 through 27. In an effort to match diet quality, supplemental alfalfa hay was added to both DRY and PAD treatments on d 21 through 27 of the trial. Ewes in the WHT treatment received their daily ration of supplement in feed buckets. The trial ended on October 22, 2010 (d 27). Body weights were recorded after a 16 h fast on d 28 and ewes were returned to the Bair Ranch and were placed on alfalfa stubble until breeding (November 1, 2010). Lambing began April 2, 2011 and the number of lambs born (NLB) for each ewe was recorded at parturition.

Trial 2. On September 6, 2011 (d 0), 60 mature ewes were randomly assigned to either DRY or PAD. The trial ended on September 19, 2011 (d 13) and ewes were weighed on d 14 after 24 h of fasting. Ewes were returned to the Red Bluff Research Ranch and placed on alfalfa stubble until breeding (November 10, 2011). Lambing began April 13, 2012 and the NLB for each ewe was recorded at parturition.

Statistical Analysis. Average daily gain and final BW were analyzed with normal linear mixed effects models, whereas NLB was sampled from a non-normal distribution (i.e., discrete count data) and thus analyzed with a Poisson mixed effects model (McCullagh and Nelder, 1989), where pen was treated as a random effect. All statistical analyses were performed in R statistical software (ver. 2.4; R Development Core Team 2011, Vienna, Austria), where GLMM models were fit with the lme4 packages (Bates et al., 2012).

RESULTS AND DISCUSSION

ADG. Overall, ADG did not differ between DRY, WHT and PAD treatments regardless of trial (P > 0.10; Table 1), suggesting similar net nutritional benefits between swathed and bale-fed pea-barley hay treatments and wheat stubble with supplementation treatments.

Final BW. Final BW among treatments did not differ (P > 0.10; Table 1). Our results are consistent with Dahmen et al. (1976) who reported that BW among four groups of mature ewes (flushed in drylot or pasture) was similar. In our study, final BW was driven by initial BW, not by feeding treatments, and as a result, final BW did not differ among treatments.

NLB. Effects of feeding treatment on NLB were not supported for either trial (Table 1). In contrast to our results, Dahmen et al. (1976) reported that NLB per ewe bred under pasture management exceeded the drylot managed ewes and was related to increased ovulation rate. Although Trials 1 and 2 differed in duration, NLB was similar for all treatments. Flushing a few weeks immediately prior to breeding is an accepted practice among producers. However, Hulet et al. (1962) reported that termination of flushing treatment 13 to 18 d prior to mating did not lower the ovulation and/or embryo survival rates relative to the controls as measured by NLB. While Hulet et al. (1962) did not increase the gap between flushing and mating beyond 18 d, they did report a greater flushing effect with increased time from 6 to 18 d between flushing and mating.

In our study, ewes were mated approximately 8 d after flushing commenced in Trial 1 and 52 d after flushing commenced in Trial 2. Irrespective of the length of time between flushing and breeding, NLB was similar for all treatments.

CONCLUSION

Feeding treatments did not influence ADG, final BW, lambing date, or NLB in our study, suggesting cost-saving benefits for sheep producers using swath grazing flushing practices. In non-extreme weather conditions, it may be more economical for livestock producers to flush ewes on pasture alone, or on a poor quality pasture with supplementation vs. confining ewes and providing full feed. As an alternative to flushing ewes immediately prior to breeding, it may be possible for producers to flush ewes on pasture earlier in the season, when forage nutrient quality is higher, and still experience a flushing effect. However, long-term studies are needed to assess the relationship between flushing and the length of time between nutritional influence and breeding.

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Table 1. Average initial and final BW, ADG, number of lambs born (NLB) and Julian lambing date to yearling ewes (Trial 1) and mature ewes (Trial 2) on 1 of 3 flushing treatments.

	Treatment[a]			
Item	DRY	PAD	WHT	*P*-value[b]
Trial 1				
Initial BW, kg	65.0 (1.1)	66.3 (1.6)	65.4 (1.6)	0.73
Final BW, kg	71.8 (1.1)	71.6 (1.6)	70.1 (1.6)	0.21
ADG, kg	0.25 (0.03)	0.22 (0.04)	0.17 (0.04)	0.14
NLB•ewe	1.45 (0.15)	1.53 (0.21)	1.64 (0.21)	0.35
Lambing date	101 (1.4)	103 (2.0)	104 (2.0)	0.16
Trial 2				
Initial BW, kg	60.8 (1.2)	63.2 (1.6)	--	0.21
Final BW, kg	62.5 (1.1)	64.7 (1.6)	--	0.95
ADG, kg	0.12 (0.03)	0.11 (0.04)	--	0.74
NLB•ewe	1.42 (0.16)	1.58 (0.23)	--	0.65
Lambing date	112 (1.2)	114 (1.6)	--	0.26

[a]DRY = ad libitum access to pea-barley hay in drylot; PAD = ad libitum access to swathed and standing pea-barley forage in paddocks; WHT = ad libitum access to swathed and standing spring wheat straw stubble with 0.45 kg of an 18.9% CP supplement$\cdot$ewe$^{-1}\cdot$d^{-1}.

[b]*P*-values for treatment effects evaluated from linear mixed effects models where Pen was included as random effect.