EFFECT OF EWE URINE AND VAGINAL SECRETIONS ON RAM INVESTIGATIVE BEHAVIOR

KARIN STEVENS, G.C. PERRY, and SUSAN E. LONG

Department of Animal Husbandry, University of Bristol
Langford, Bristol, BS18 7DU, UK

(Received December 22, 1980; revised March 31, 1981)

Abstract—Urine from estrous ewes increased the investigative premating activity of the ram. Estrous vaginal tampons resulted in a decrease. The flehmen response of the ram was closely associated with urination by the ewe.

Key Words—Pheromones, urine, vaginal secretions, sheep, flehmen.

INTRODUCTION

In various mammalian species, premating behavior is thought to have olfactory components. Numerous studies have shown an increase in male investigative behavior and/or an effect on mating behavior, when males are presented with estrous female secretions or odors. Doty and Dunbar (1974) found that sexually experienced male dogs spent more time investigating urine and vaginal odors from estrous bitches than similar nonestrous secretions. Paleologou (1977) reported increased interest, and mounting attempts, when vaginal mucus from an estrous cow was rubbed on a dummy. Sambraus and Waring (1975) found that bulls used for natural service preferred nonestrous cows marked with estrous rather than nonestrous urine, whereas bulls used for semen collection at artificial insemination centers showed no such preference. Kiddy et al. (1978) trained dogs to detect by smell vaginal swabs from estrous cows. Subsequently dogs trained on vaginal swabs successfully selected estrous urine samples without being specifically trained for urine, suggesting that an odorous substance may be common to both urine and vaginal secretions.

In a few species, components of the secretions responsible for the attraction and arousal responses have been identified. Goodwin et al. (1979)
found that methyl-\(p\)-hydroxybenzoate, a component in estrous bitch vaginal secretions, induced sexual arousal in male dogs, who attempted to mount nonestrous bitches smeared with this substance. Singer and Agosta (1976) found that dimethyl disulfide, a component in estrous hamster vaginal secretion, elicited approaching, digging, and sniffing by the male.

In sheep, ram courtship behavior has olfactory components, since it involves sniffing and nosing the vulva of estrous ewes. Lindsay (1965) found that anosmic rams approached all ewes at random, whereas normal rams preferred estrous ewes. Premating behavior in anosmic rams was considerably modified, but mounting was not affected. Fletcher (1968) also reported a reduction in anosmic rams' ability to find estrous ewes. Kelley (1937) found that smearing pregnant ewes with vaginal swabs from estrous ewes increased the investigative behavior of the ram.

The present study was designed to assess the importance of the olfactory information contained in estrous urine and vaginal secretions in sheep and to find a valid quantifiable assessment of ram interest.

**METHODS AND MATERIALS**

A total of three preference experiments were conducted. Experiment 1 compared ram reactions to estrous and ovariectomized or metestrous ewes (days 5–11 of the cycle) to establish the behavior pattern of the rams under the artificial test conditions. Experiment 2 investigated the effect of fresh (<3 hr old) estrous vaginal tampons on ram behavior. Experiment 3 investigated the effect of fresh (<3 hr old) estrous urine on ram behavior.

Ten mature Clun-cross ewes were used. Two were ovariectomized and the remaining eight, with normal estrous cycles (15–18 days), were used during the estrous and metestrous stage. Estrus was determined by use of a teaser vasectomized ram; metestrus was considered to be days 5–11 of the estrous cycle. The ovariectomized ewes were never marked by the teaser ram. Estrous vaginal mucus was sampled by inserting a small vaginal tampon (Lillets) for periods ranging from 1 to 20 hr. Urine samples were collected in small modified pediatric urine bags within a maximum time of 3 hr after diagnosis of estrous. Preference tests were conducted within 3 hr of sample collection. The ram population comprised five males, each with a minimum of three season's flock breeding experience, and two ram lambs without mating experience.

In a preference test, a pair of ewes was restrained, 2 m apart, facing away from the ram, who was confined behind a metal gate immediately at the rear of the ewes. All animals were habituated to the test situation for a minimum of 20 min each day for 2 weeks before the beginning of the test series. Each test lasted for 5 min. In all tests several behavioral criteria were used to quantify