The effect of dog urine on lawn grasses is reported. Materials and methods used in testing on four plots of lawn grasses are described. Color illustrations of the results of the experimentation are included. Six studies of various urine concentrations are discussed and the results presented in tabular format. Recommendations for preventing lawn burn from dog urine are included.

*A PRACTITIONER REPORT*

# Lawn Burn from Dog Urine

**A. Wayne Allard, D.V.M.**
Director, Allard Animal Hospital
714 North Taft
Loveland, Colorado 80537

*Though this report is not strictly within the medical and surgical care area usually presented in* Canine Practice *we felt that this study offered practitioners useful information to discuss with their clients. The problem of lawn damage is often a consideration in choosing a dog as a pet and the suggestions here will give practitioners information to offer their clients in solving this problem.*

*The Editors*

## Introduction

A survey of Colorado practitioners and a literature review indicated a need for information about the effect of dog urine on lawn grasses. This article is an attempt to provide information on the problem and to encourage further study.

## Materials and Methods

In May four plots were established on a lawn of mixed grasses consisting mainly of fescue grass (*Festuca sp. var. Kentucky 31*). Definitions of various degrees of effects on lawns were established.

- Fertilizer effect: Lush green growth, no brown discoloration of leaves.
- Slight burn: Lush peripheral growth, discoloration of leaves, grass returns in 30 days (Fig. 1).
- Moderate burn: Lush peripheral growth, small brown spot persists after 30 days (Fig. 2).
- Severe burn: Lush peripheral growth, large brown spot persists after 30 days (Fig. 3).

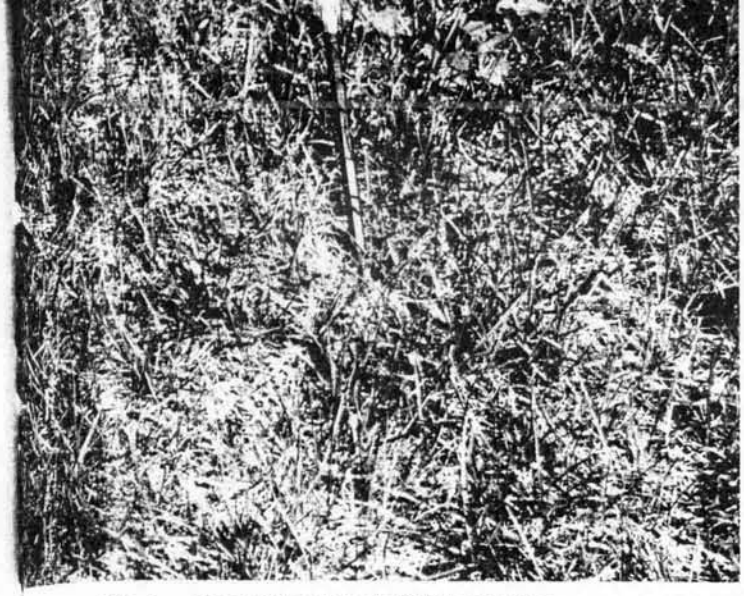


Fig. 1 — Pen marks area of slight lawn burn.

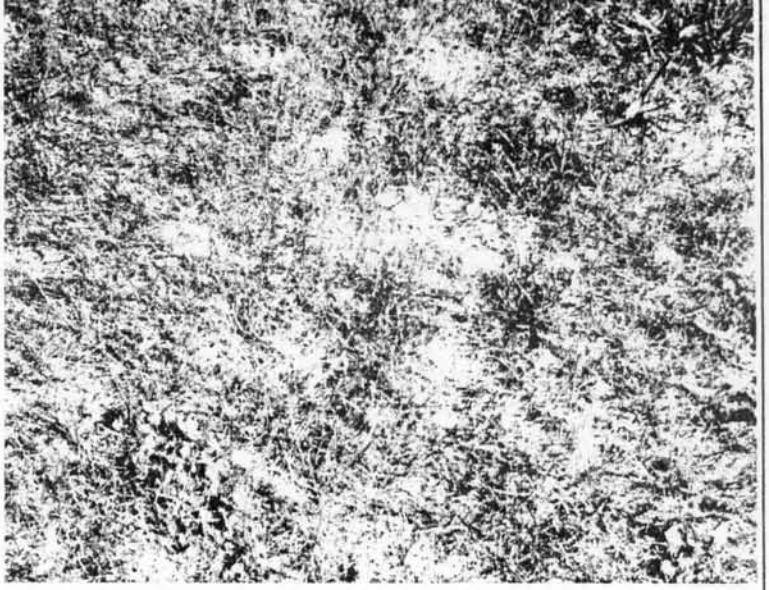


Fig. 2 — Moderate lawn burn.

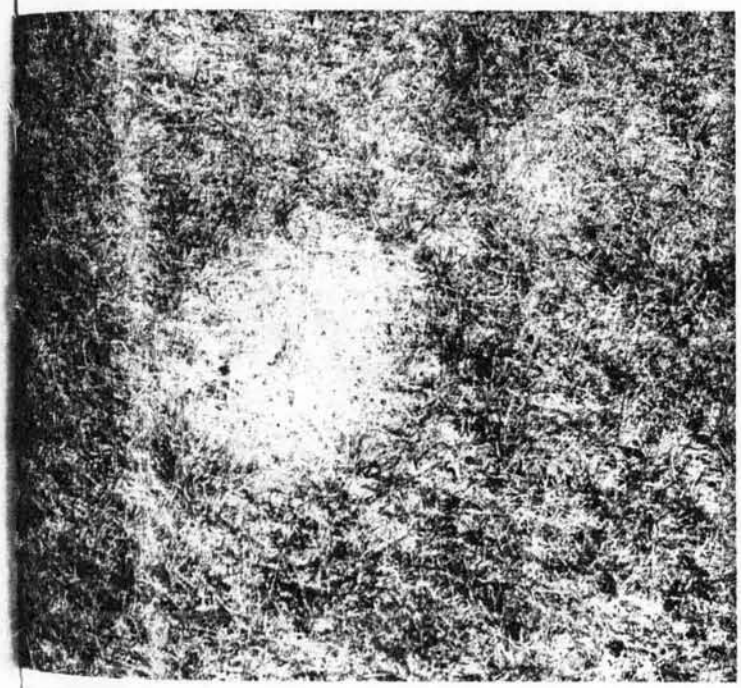


Fig. 3 — Severe lawn burn.

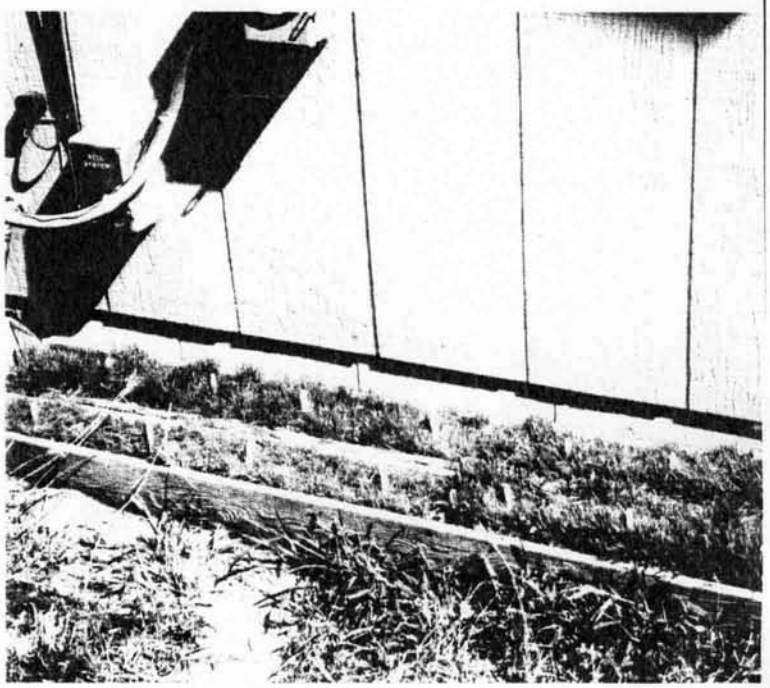
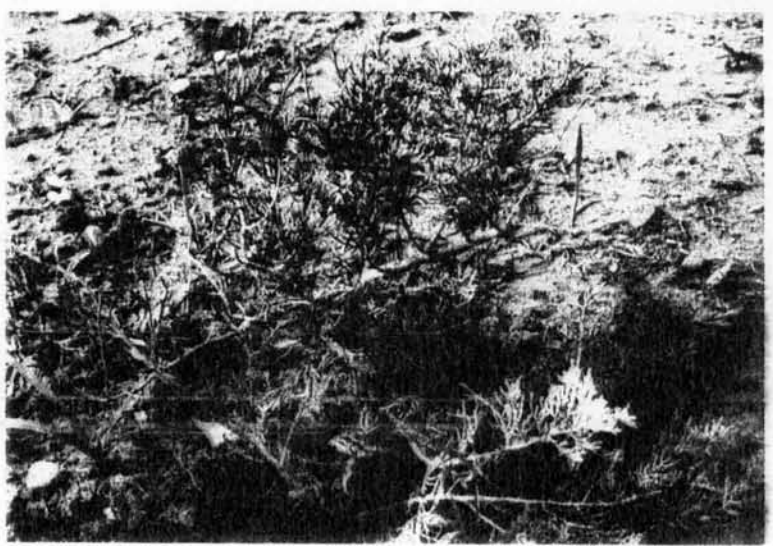


Fig. 4 — Grasses staked prior to applying urine.

*Continued*

Fig. 5 — Grasses 9 days after application of urine samples.

Fig. 6 — A small evergreen urinated on by a male dog. Two branches at base are the only part not affected.



laboratory data was helpful in that it evaluated pH, urinary tract infections and aided in urine volume-concentration studies.

### Discussion

The pH of urine has no effect on lawn burn, but DL-methionine had some effect in reducing lawn burn. This can be explained by the transient diuretic effect from urinary acidifiers.[1] The more dilute urine is less toxic to lawn grass. Salt seems to be a more effective and economical alternative to DL-methionine. In fact, a history where a dog has suddenly quit burning the lawn would warrant further consideration of medical problems associated with diuresis.

Lawn burn would be less of a problem with those owners who water their lawns frequently and who have a more resistant species of lawn grass. Fescue grass is the most resistant of the four main grasses grown in Colorado.

Small dogs that urinate smaller amounts of urine would be less of a problem. Also one might conclude that male dogs would be less of a problem than female dogs because male dogs are more territorial[2] and tend to urinate small amounts in a number of different locations.

The amount of solutes in the urine and how it relates to the type of grass, urine volume, and lawn watering determines the degree of urine burn. Quantifying the effect of urinary nitrogenous waste on lawns and its relation to diet would require additional studies that might be undertaken by a commercial dog food company. Recommendations on preventing lawn burn from dog urine include:

- Consider having small dogs as pets if they are confined on lawn grass.
- Water frequently. If there is a water scarcity divide the lawn into three areas, watering each area once every 3 days immediately after removing the dog. Leave dog in each area no longer than 1 day.
- Plant a resistant grass. Fescue grass is best or a rye grass may be considered.

*Continued*

TABLE 5
**Effects of Variable Solutes[a] on Four Varieties of Grasses[b] 2 Days After 120 cc Urine Applied**

| Specific Gravity | Osmolality | *Poa sp.* | *Cynodon sp.* | *Lolium sp.* | *Festuca sp.* |
|---|---|---|---|---|---|
| 1.065 | 1744 mOs/kg | severe | severe | severe | severe |
| 1.045 | 1340 mOs/kg | severe | severe | severe | moderate |
| 1.035 | 1174 mOs/kg | severe | severe | moderate | slight |
| 1.025 | 515 mOs/kg | severe | severe | fertilizer effect | fertilizer effect |

a. Quantity of urine applied was 120 cc; pH was 7.0.
b. Grasses were watered 2 days after application.

TABLE 6
**Responses to Practitioner Survey[a]**

| Response | No. of Responses |
|---|---|
| Lacked success | 16 |
| Recommended urinalysis | 6 |
| Removed from grass | 6 |
| Treated dog (urinary acidifiers) | 17 |
| Treated lawn (watered) | 13 |
| Treated lawn (soapy water) | 1 |
| Treated dog (Vitamin C) | 1 |
| Treated dog [low protein (high quality protein) diet] | 6 |
| Treated dog (salt) | 2 |
| Treated dog (baking soda) | 1 |
| Inadvisable to treat dog | 2 |

a. 31 responses from practices were received from 65 requests.

### Study 5

Study 5 consisted of four plots with different lawn grasses and each plot was staked to mark four variable specific gravity samples of 1.025 (515 mOs/kg), 1.035 (117 mOs/kg), 1.045 (1340 mOs/kg) and 1.065 (1744 mOs/kg) (Fig. 4). The four grasses were *Poa pretensis* (Kentucky bluegrass), *Lolium perrene* (fine bladed rye), *Festuca sp. var.* Kentucky #31 (Fescue), and *Cynodon sp. var. fairway* (Fairway crested wheat). A composite urine sample was collected and divided into four different dilutions. Each solution was applied to the four plots of grass (Figs. 4 & 5). Samples of each solution were frozen and sent to the laboratory to be tested for osmolality. Osmolality values are an average between two readings on the Wescor vapor Osmometer (Table 5).

### Study 6

Study 6 consisted of the survey question, "How do you treat lawn burn from dog urine?" sent to 65 Colorado practices. Thirty-one responses were received and summarized (Table 6).

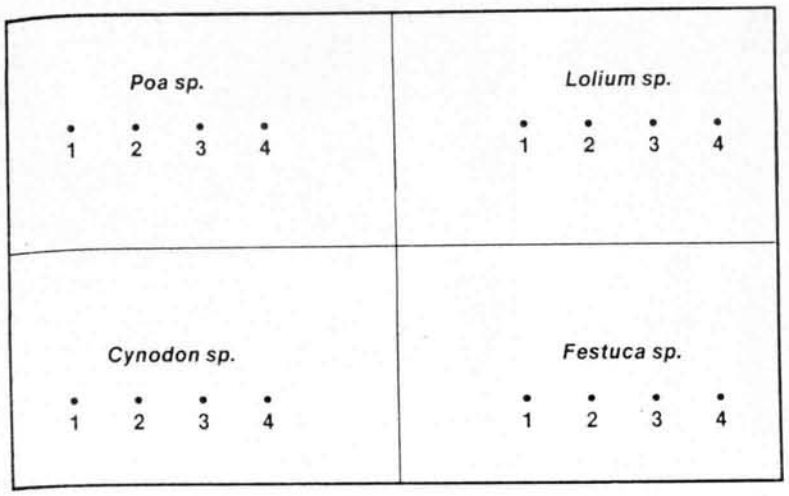
### Results

Study 1 showed no difference on lawn grass between pH 5.0 and 8.0. All three urine samples caused marked urine burn. In Study 2 DL-methionine (urinary acidifier) moderately reduced the effect of urine on lawn grass while salt had a greater effect. Study 3 showed that water applied to grass less than 12 hours after dog urine prevented grass kill and allowed only a slight burn before 1 day. In Study 4 the quantity of urine has no effect under 15 cc with a specific gravity of 1.065. Thirty cc caused only slight burn, 60 cc caused moderate burn and any amount over 120 cc caused marked burn.

Study 5 revealed that Kentucky bluegrass and Fairway crested wheat grass were very susceptible to burn from dog urine. Rye grass was more resistant and fescue grass was the most resistant. Depending on the species of grass, high concentrations of urinary solutes caused more burn than low concentrations.

In the sixth study, out of 31 practices responding, 55% used urinary acidifiers, 42% recommended watering the lawn, 52% indicated a lack of success with any treatment and many cited the obvious but not always practical solution of removing the dog from the grass. Six of the respondents suggested that reducing the excessive urinary nitrogenous wastes with high quality low protein diets would be of value. Several also felt that

**Diagram of Figures 4 and 5**




### Study 1

Study 1 consisted of a composite dog urine sample divided in 150 cc units, with a variable pH. Solution A was 150 cc of composite sample acidified by adding vinegar ($C_2H_2O_2$). Solution B was 150 cc of composite sample with pH of 6. Solution C was 150 cc of composite sample alkalinized by adding sodium bicarbonate ($NaHCO_3$). Solution D was 150 cc of water acidified by adding vinegar. Solution E was 150 cc of water alkalinized by adding $NaHCO_3$ (Table 1).

### Study 2

Study 2 consisted of three urine samples collected from the same dog used in Study 1. The first 150 cc sample was collected just prior to giving 550 mg DL-methionine (4.4 mg/kg body weight). The second 150 cc sample was collected 24 hours after treatment with DL-methionine (only urine voided after treatment). The dog was given 2 days to stabilize its urine back to the original pH and specific gravity values and treated with 2 gms of NaCl (80 mg/kg body weight). The third 150 cc sample was collected 24 hrs after this salt treatment (Table 2).

### Study 3

Study 3 consisted of applying 150 cc composite urine samples on the lawn and watering the plots with 500 cc of tap water at varying time intervals (Table 3).

### Study 4

Study 4 consisted of applying a composite urine sample in different quantities (Table 4).

**TABLE 1**
**Effects of Variable pH 150 cc Solutions on Fescue Grass[a]**

| Solution | Effect on Lawn |
|---|---|
| Sol. A[b] (pH 5.0) | severe burn |
| Sol. B[b] (pH 6.0) | severe burn |
| Sol. C[b] (pH 8.0) | severe burn |
| Sol. D ($H_2O$, pH 5.0) | no effect |
| Sol. E ($H_2O$, pH 8.0) | no effect |

a. Grass was watered 2 days after application of solutions.
b. Specific gravity = 1.065

**TABLE 2**
**Effects of 150 cc Urine Samples From Variable Treatments on Fescue Grass[a]**

| Treatment | pH | Specific Gravity | Effect |
|---|---|---|---|
| No treatment | 7.0 | 1.065 | severe burn |
| DL-methionine | 6.5 | 1.043 | moderate burn |
| NaCl | 6.5 | 1.040 | slight burn |

a. Grass was watered 2 days after application of urine samples.

**TABLE 3**
**Effects of Watering at Varying Time Intervals on Fescue Grass Treated with 150 cc Urine[a]**

| Application of Water | |
|---|---|
| $H_2O$ applied immediately | fertilizer effect |
| Applied 4 hrs later | fertilizer effect |
| Applied 8 hrs later | fertilizer effect |
| Applied 12 hrs later | slight burn |
| Applied 1 day later | moderate burn |

a. pH of urine was 7.0.

**TABLE 4**
**Effects of Application of Varying Quantities of Urine[a] to Fescue Grass[b]**

| Quantity of Urine | Effects |
|---|---|
| 15 cc urine | no effect |
| 30 cc urine | slight burn |
| 60 cc urine | moderate burn |
| 120 cc urine | severe burn |
| 240 cc urine | severe burn |

a. Urine had pH of 7.0 and specific gravity of 1.065.
b. Grass was watered 2 days after application of urine samples.

*Continued*

- Add salt with plenty of water to promote diuresis and low urine concentrations.
- Consider a male dog instead of a female dog if you don't have evergreens (Fig. 6).
- A urinalysis would be valuable in evaluating salt therapy and eliminating those disease processes which might increase solutes.
- If feasible, fence off animals from lawn. ■


**REFERENCES**

1. Goodman LS and Gilman A: The Pharmacological Basis of Therapeutics, ed 4. The MacMillan Company, 1970, p 844.
2. Campbell WE: Behavior Problems in Dogs. Amer Vet Publ Inc, 1975, p 201.