No. 8300154

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Kentucky Agricultural Experiment Station
and USDA-ARS

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF eighteen YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

TALL FESCUE

'Johnstone'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office *to be affixed at the City of* Washington *this* 29th *day of* March *in the year of our Lord one thousand nine hundred and* eighty-five.

Attest:

Kenneth R. Evans

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

John R Block

Secretary of Agriculture

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, MEAT, GRAIN & SEED DIVISION

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

FORM APPROVED: OMB NO. 0581-0055

No certificate for plant variety protection may be issued unless a completed application form has been received (5 U.S.C. 553).

1. NAME OF APPLICANT(S): University of Kentucky - USDA-ARS

2. TEMPORARY DESIGNATION: G1-320

3. VARIETY NAME: Johnstone

4. ADDRESS *(Street and No. or R.F.D. No., City, State, and Zip Code)*: Agronomy Department, Agricultural Science Center-North, Lexington, KY 40546-00914

5. PHONE *(Include area code)*: 606/258-2683

FOR OFFICIAL USE ONLY

PVPO NUMBER: 8300154

6. GENUS AND SPECIES NAME: Festuca arundinacea

7. FAMILY NAME *(Botanical)*: Gramineae

FILING — DATE: 7/11/83 — TIME: 2:30 [ ] A.M. [X] P.M.

8. KIND NAME: Tall fescue

9. DATE OF DETERMINATION: 1980

FEES RECEIVED — AMOUNT FOR FILING: $ 1,000 — DATE: 7/11/83 — AMOUNT FOR CERTIFICATE: $ 500.00 — DATE: 2/14/85

10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION *(Corporation, partnership, association, etc.)*: Institution

11. IF INCORPORATED, GIVE STATE OF INCORPORATION:

12. DATE OF INCORPORATION:

13. NAME AND ADDRESS OF APPLICANT REPRESENATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS
Robert C. Buckner, USDA-ARS
Agronomy Department
University of Kentucky
Lexington, KY 40546-0091

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED

a. [X] Exhibit A, Origin and Breeding History of the Variety *(See Section 52 of the Plant Variety Protection Act.)*

b. [X] Exhibit B, Novelty Statement

c. [X] Exhibit C, Objective Description of the Variety *(Request form from Plant Variety Protection Office.)*

d. [ ] Exhibit D, Additional Description of the Variety

15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act.)* [X] Yes *(If "Yes," answer items 16 and 17 below)* [ ] No

16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? [X] Yes [ ] No

17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED? [X] Foundation [X] Registered [X] Certified

18. DID THE APPLICANT(S) FILE FOR PROTECTION OF THE VARIETY IN THE U.S. OR OTHER COUNTRIES?
U.S. only
[ ] Yes *(If "Yes," give names of countries and dates)*
[X] No

19. HAVE RIGHTS BEEN GRANTED IN THE U.S. OR OTHER COUNTRIES?
[ ] Yes *(If "Yes," give names of countries and dates)*
[X] No

20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT: Robert C. Buckner — Robert C. Buckner — DATE: 6-14-83

SIGNATURE OF APPLICANT: Charles E. Barnhart — Charles E. Barnhart — DATE: 6/14/83

FORM LMGS-470 (9-81) (Edition of 1-78 is obsolete)

INSTRUCTIONS

General: Send an original copy of the application and exhibits, at least 2,500 viable seeds, and ~~$500~~ 1,000 fee (*$250 filing fee and $250 examination fee*) to U.S. Department of Agriculture, Agricultural Marketing Service, Livestock, Meat, Grain and Seed Division, Plant Variety Protection Office, National Agricultural Library Building, Beltsville, Maryland 20705. *(See section 180.175 of the Regulations and Rules of Practice.)* Retain one copy for your files. All items on the face of the form are self-explanatory unless noted below.

Item

9 Give the date the applicant determined that he had a new variety based on (1) the definition in section 41(a) of the Act and (2) the date a decision was made to increase the seed.

14a Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method; (2) the details of subsequent stages of selection and multiplication; (3) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified and (4) evidence of uniformity and stability.

14b Give a summary statement of the variety's novelty. Clearly state how this novel variety may be distinguished from all other varieties in the same crop. If the new variety most closely resembles one or a group of related varieties: (1) identify these varieties and state all differences objectively; (2) attach statistical data for characters expressed numerically and demonstrate that these differences are significant; and (3) submit, if helpful, seed and plant specimens or photographs of seed and plant comparisons clearly indicating novelty.

14c Fill in the Exhibit C, Objective Description form, for all characteristics for which you have adequate data.

14d Describe any additional characteristics that are not described, or whose description cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the description of characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, etc.

15 If "Yes" is specified *(seed of this variety be sold by variety name only as a class of certified seed)* the applicant may NOT reverse his affirmative decision after the variety has either been sold and so labeled, his decision published, or the certificate has been issued. However, if the applicant specified "No," he may change his choice. *(See section 180.16 of the Regulations and Rules of Practice.)*

16 See section 42 of the Plant Variety Protection Act and section 180.7 of the Regulations and Rules of Practice.

GPO 890-698

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Exhibit A - Origin and Breeding History of Johnstone.

The synthetics, G1-307 or G1-318 and G1-316 used as a blend to form breeder seed of Johnstone (G1-320), were derived by hybridization of annual and perennial ryegrass with tall fescue.

Annual ryegrass (Lolium multiflorum Lam.) (2n=14) was pollinated with single plant selections of Kentucky 31 tall fescue (Festuca arundinacea Schreb.) (2n=42) to produce F_1 hybrids (2n=28). Ancestry of the low perloline Kenhy lines (G1-316) is as follows: Male-sterile F_1 hybrids were treated with the fertility drug, colchicine, in an effort to achieve seed-set. Plants obtained from the F_1 hybrids after colchicine treatment were screened during the fourth generation for stable and fertile tall fescue (2n=42) plant derivatives. The 42-chromosome plants were selected for low perloline content and superior forage quality characteristics. The resultant selected clones were polycrossed and the polycross progenies used to produce syn. 1 seed. The syn. 2 seed was accessioned G1-316.

G1-307 or G1-318 accessions are synthetics of annual and perennial ryegrass x tall fescue hybrid derivatives produced as follows: F_1 hybrids (2n=28) were backcrossed to tall fescue one or two generations until fertility and meiotic stability was achieved. Hybrid derivative clones (2n=6X=42) were screened for improved forage quality and low perloline content. Selected clones were crossed in a diallel scheme with low perloline Kenhy clones and progenies were screened for improved quality and perloline content. Twenty-nine clones were selected as diallel and polycross progenies of annual and perennial ryegrass x tall fescue backcross hybrids, and of the Kenhy low perloline clones. Polycross progenies (syn. 1) of the 29 selected clones produced syn. 2 seed in Prosser, Washington, which was accessioned G1-307 and syn. 2 seed produced of the identical clones grown in Madison County, Kentucky, was accessioned G1-318. Breeder seed of Johnstone consists of one-third G1-316 and two-thirds G1-307 or G1-318. The variety appears to be stable with little variability observed within the population.

The component synthetic strains of G1-316 and G1-307(318) and equivalent breeder seed of Johnstone were evaluated (1975-1981) and compared in replicated sod plots in Kentucky, Iowa, North Carolina, South Carolina, Florida, Arkansas, and Prince Edward Island, Canada, with Kenhy and Kentucky 31 for yield, forage quality, and antiquality characteristics, and agronomic performance. Animal performance was evaluated to check for summer toxicosis symptoms of G1-307 or G1-318 and Johnstone (breeder), Kentucky 31 tall fescue and Boone orchardgrass by feeding soilage to young cattle (300-400 lbs. each) under high temperature stress (See tabular data).

Exhibit B - Data Indicative of Novelty.

'Johnstone' tall fescue most closely resembles 'Kenhy' than any other variety. Novelty for Johnstone, when compared with Kenhy, is claimed primarily on the basis of lower perloline content. At times, Johnstone and component strains will have 50 to 60% less perloline content than Kenhy. Novelty is also claimed for Johnstone and component strains having forage quality (digestibility, fiber content, moisture content, and palatability) superior to Kenhy.

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Amendment for Exhibit A

Stability statement.—Strains G1-316 and G1-318 that form Johnstone tall fescue are closely related, therefore, Johnstone breeds true and is stable for the characters for which the variety was developed. G1-316 is a synthetic of 7 low perloline clones. G1-318 is a synthetic of 29 clones, selected for low perloline content, from parental lines developed by crossing /(annual and perennial ryegrass x tall fescue) x tall fescue/ x the 7 G1-316 clones. No variants have been observed during eight years of tests comparing Johnstone with other varieties.

Exhibit C - Objective Description of Johnstone.

Johnstone has a similar genetic background to the Kenhy variety and most closely resembles Kenhy to any other tall fescue variety. When managed as hay and pasture, dry matter yields are equivalent to Kenhy. Johnstone or the component strains G1-307(318) and G1-316 was either equal to or significantly superior to Kenhy in foliar color, fiber content and digestibility. Johnstone and component strains had significantly lower leaf roll than Kenhy which, perhaps, explains the higher moisture content and significantly superior acceptability to cattle when grazed free choice during summer.

Exhibit D - Additional Description of the Variety.

Attachment - Registration of Johnstone Tall Fescue. Crop Science 23:399-400. 1983.

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Table 1. Perloline levels (µg/g) of Kenhy, Johnstone and component strains, G1-316 and 307(318).

Cultivars and strains	Test No. 108 1975-76		110 1977	Beltsville, Md. 1976	1977	1978	Mean	116
Kenhy	1000	2440	587	770	1090	860	907	
Johnstone	318	820	213	-	-	-	-	
G1-316	380	1147	267	-	-	-	-	
G1-307(318)	260	1310	120	355	540	275	390	
Ky. 31	-	-	427	660	1420	1020	1033	
L.S.D. at .05	295	875	149					
C.V. (%)	16	20	33					

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Table 2. Color scores of Kenhy, Johnstone and component strains, G1-316 and G1-307(318).[1/]

Cultivar or Strain	Test No. 109 1978 March	July	Nov.	107 Year 9/4/75	8/20/76
Kenhy	3.5	3.5	3.0	1.0	3.7
Johnstone	1.0	2.0	1.5	-	-
G1-316	-	-	-	1.0	1.7
G1-307	1.0	4.0	1.5	1.0	1.0
Ky. 31	5.0	8.5	5.5	3.7	5.7
L.S.D. at .05	1.4		1.3	1.6	1.4
C.V. (%)	26		33	30	24

[1/] 1 = green; 9 = brown.

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Table 3. Palatability scores of Kenhy, Johnstone, and component strains, G1-316 and G1-320, when grazed free-choice with cattle.[1/]

Cultivar or Strain	Test No. 108 1975	108 1976	110 8/5/76	110 9/29/76	110 8/30/77	110 9/26/77
Kenhy	4.5	3.0	4.0	4.0	6.0	5.0
Johnstone	2.5	3.5	3.0	2.5	3.0	2.5
G1-316	4.5	4.0	4.5	4.0	5.0	3.5
G1-307	3.0	3.0	3.5	1.0	2.5	1.0
Ky. 31	6.0	6.5	7.5	5.5	8.0	5.5
L.S.D. at .05	2.1	1.8	1.3	2.0	2.1	1.9
C.V. (%)	44	33	24	41	32	41

[1/] 1 = best grazed; 9 = ungrazed.

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TABLE 5D.
FORAGE INTAKE AND PHYSIOLOGICAL RESPONSE FOR CALVES MAINTAINED IN ENVIRONMENTAL CONTROLLED ROOMS AT 88°F [1/]

	Orchardgrass	GI-307 Fescue	GI-320 or Johnstone Fescue
Daily Forage Intake (g/kg $BW^{.75}$)	74.2	55.0	64.2
Respiration rate	82.5	92.8	63.8
Rectal temperature	104.2	104.7	103.9

[1/] Test conducted during 1981.

1981 DATA

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TABLE 5 E. COMPARISON DURING 1981 OF ENDOPHYTE-FREE TALL FESCUE SELECTIONS WHICH ARE HIGH OR LOW IN PERLOLINE CONTENT

	Fescue	
	G1-306	G1-318 (307)
Average Perloline Content (ug/g)	1084	232
Heifer Study		
Intake (g D.M./kg $BW^{.75}$)	85.9[a]	87.0[a]
Rectal Temperature	101.6[a]	101.9[a]
Average daily gain (kg)	.48[a]	.54[a]
Calf Control Temp. Study		
Intake (g D.M./kg $BW^{.75}$)	65.7[a]	69.2[a]
Rectal Temperature		
Total Period	103.8[a]	103.3[a]
1st 16 days	103.7[a]	103.0[b]
Respiration Rate (counts/min.)	89.3[a]	92.9[a]
Body wt. change (kg)	-5.75[a]	+3.75[a]

[ab]Those with different letter are significantly different ($P < .05$).

1981 DATA

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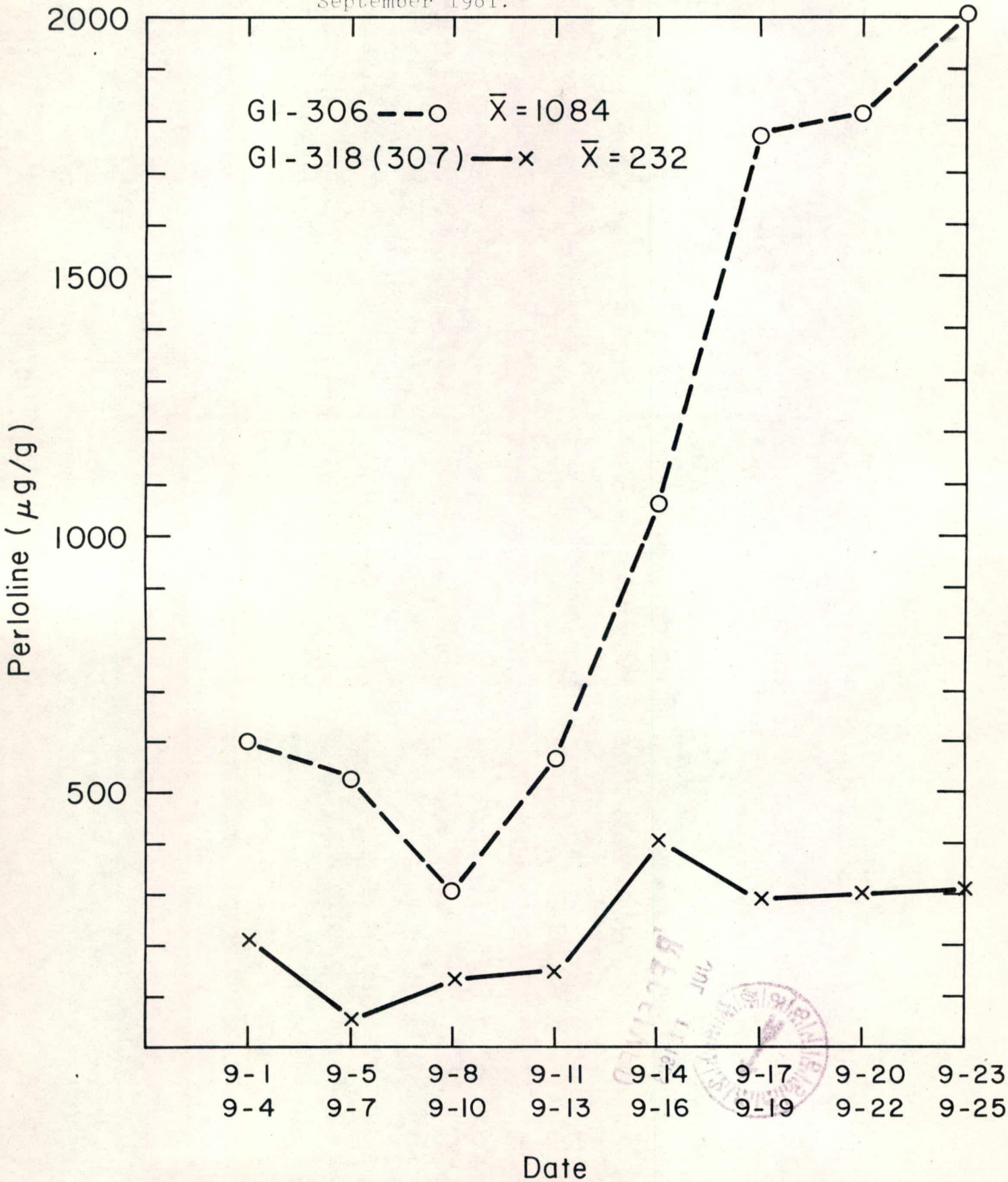
Figure 1. — Perloline levels of endophyte-free Gl-306 and Gl-318 (Gl-307) tall fescue strains during September 1981.



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Chopped Hay Exp, 1981 Rectal Temp. by 3 day increments 8300154

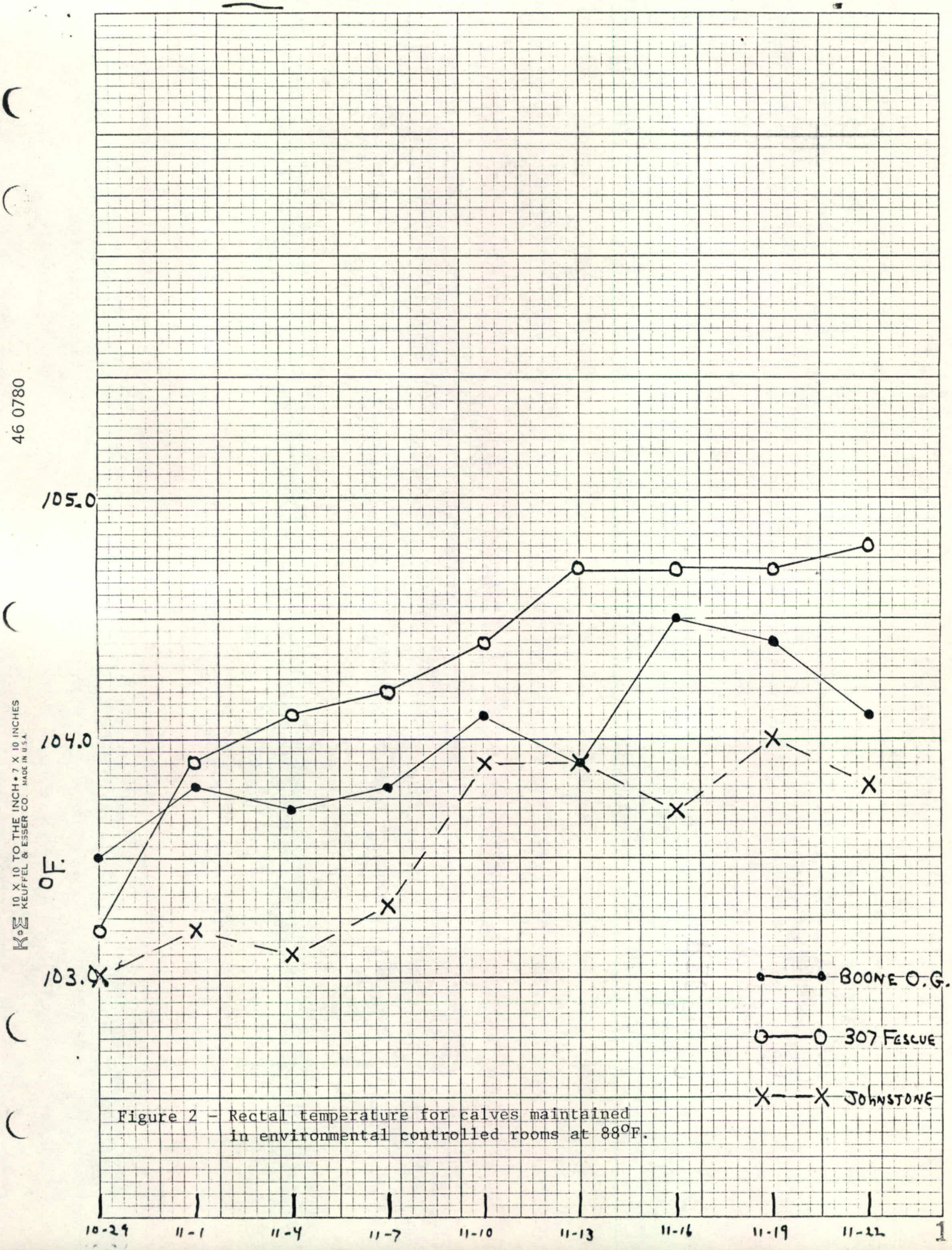

Figure 2 - Rectal temperature for calves maintained in environmental controlled rooms at 88°F.

46 0780
K&E 10 X 10 TO THE INCH • 7 X 10 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A.

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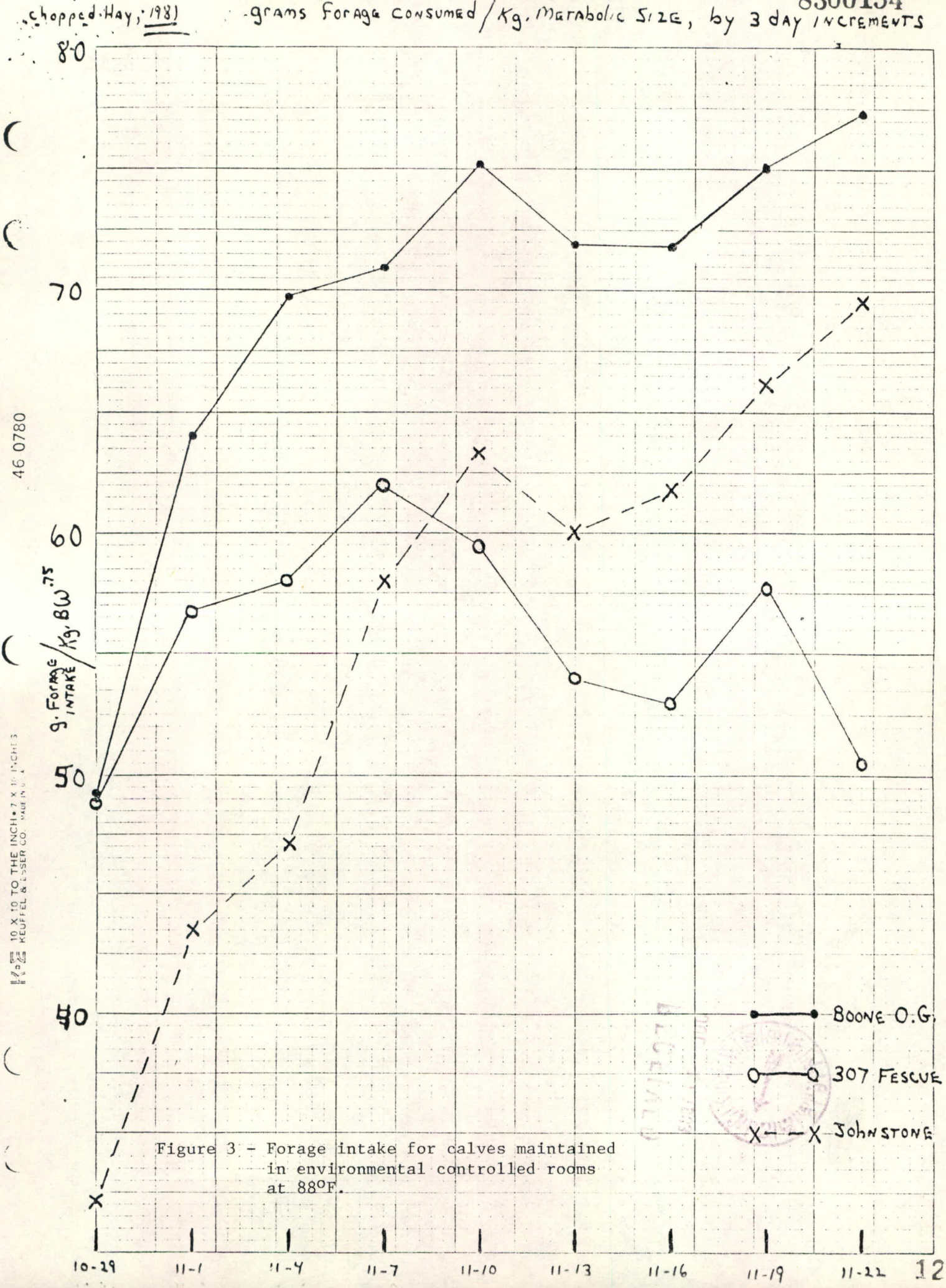

Figure 3 - Forage intake for calves maintained in environmental controlled rooms at 88°F.

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10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

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Reprinted from *Crop Science*
Vol. 23, March-April 1983, p. 399-400

REGISTRATION OF JOHNSTONE TALL FESCUE[1]
(Reg. No. 23)

R. C. Buckner[2], J. A. Boling[3], P. B. Burrus, II[2], L. P. Bush[4], and R. A. Hemken[3]

'JOHNSTONE' tall fescue (*Festuca arundinacea* Schreb.) was developed cooperatively by the Kentucky Agricultural Experiment Station and the USDA-ARS.

Johnstone is a blend of synthetic 2 seed from two low perloline [an alkaloid that inhibits digestibility in ruminants] strains accessioned G1-316 and G1-307 (318). Accession G1-316 consists of seven parental clones of 'Kenhy,' and accessions G1-307 and/or G1-318 consist of 29 parental clones derived by outcrossing F_1 annual (*Lolium multiflorum* Lam.) and perennial (*L. perenne* L.) ryegrass × tall fescue hybrids to their 2n=56 chromosome amphiploids and to tall fescue. Fertile and meiotically stable hybrid derivative clones (2n=6x=42 chromosomes) used to develop G1-307 (318) were selected in two cycles of restricted recurrent selection for low perloline content and improved succulence and digestibility during summer (2, 3). Johnstone has from 50 to 60% less (significantly) perloline content than Kenhy and Kentucky 31 tall fescue which is the superior unique trait of the new variety.

Johnstone is adapted for pasture, hay, and conservation purposes throughout the transition zone of the USA. Since 1975, Johnstone and component strains, G1-316 and G1-307 (318) were compared with commercial varieties of tall fescue for forage quality and some agronomic characteristics on Experiment Station Farms in Kentucky, Arkansas, Iowa, Florida, North and South Carolina, and Prince Edward Island, Canada. Data indicate that Johnstone and component strains, G1-316 and G1-307 (318) were significantly superior to Kentucky 31 in palatibility, digestibility, and color and superior to Kenhy for color during drought. Dry matter yields were not different from Kenhy.

Perloline, a major alkaloid of tall fescue, reduced in vitro cellulose and in vivo protein and cellulose digestibility (1). Young cattle consuming tall fescue soilage that was free of the endophytic fungus, *Epichloe typhina* (= *Acremonium coenophialum*), with high perloline content exhibited summer toxicosis symptoms and had significantly higher rectal temperatures than cattle receiving endophyte-free G1-307 (318) soilage.

A direct positive relation was found between the fungal endophyte in tall fescue and summer toxicosis symptoms of young Holstein steers feeding on infected tall fescue under high ambient temperature stress in environmentally controlled rooms (1). The primary method of transmission of the endophyte is through the seed. The fungus does not survive and, therefore, is not transmitted through seed that is a minimum of two years old (4).

Seed of Johnstone will be produced on a limited generation basis. The classes of seed are : 1) breeder, 2) foundation, and 3) certified. Breeder seed consists of one-third G1-316 and two-thirds G1-307 (318) and is maintained by the Kentucky Agricultural Experiment Station. An application will be made for Plant Variety Protection specifying that all seed sold by variety name must be certified. Breeder's seed of Johnstone will be endophyte-free and all other classes of seed must be laboratory tested and shown to have low level infestation of *Epichloe typhina* before approval for certification.

ACKNOWLEDGMENT

The authors are grateful to Dr. John R. Hardison, professor of Plant Pathology, Dep. of Botany and Plant Pathology, Oregon State Univ., Corvallis, Ore., for seed treatment of G1-316 to remove *Epichloe typhina*.

REFERENCES

1. Boling, J.A., R.W. Hemken, L.P. Bush, R.C. Buckner, J.A. Jackson, Jr., and S.G. Yates. 1983. Role of alkaloids and toxic compound(s) in the utilization of tall fescue by ruminants. p. 722-725. *In* J.A. Smith and V.W. Hays (ed.) Proc. 14th Int. Grassl. Congr. Lexington, Ky. 15-24 June 1981. Westview Press, Boulder, Colo.
2. Buckner, R.C., L.P. Bush, and P.B. Burrus, II. 1973. Variability and heritability of perloline in *Festuca* sp., *Lolium* sp., and *Lolium-Festuca* hybrids. Crop Sci. 13:666-669.
3. ----, ----, and ----. 1979. Succulence as a selection criterion for improved forage quality in *Lolium-Festuca* hybrids. Crops Sci. 19:93-96.
4. Neill, J.C. 1941. The endophyte of *Lolium* and *Festuca*. N.Z.J. Sci. Technol. 23:185A-193A.

[1] Cooperative investigations at Lexington, Ky. of the USDA-ARS, and Dep. of Agronomy, Univ. of Kentucky Agric. Exp. Stn. The investigation reported in this paper (No. 82-3-5-114) is in connection with a project of the Kentucky Agric. Exp. Stn. and is published with the approval of the Director. Accepted 4 Nov. 1982.

[2]Research agronomists, USDA-ARS, also professor and research specialist, respectively, Agronomy Dep. Univ. of Kentucky, Lexington.
[3]Professors of animal science, Univ. of Kentucky, Lexington.
[4]Professor of agronomy, Univ. of Kentucky, Lexington.

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U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, MEAT, GRAIN AND SEED DIVISION
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Tall & Meadow Fescues)

OBJECTIVE DESCRIPTION OF VARIETY

TALL & MEADOW FESCUES

(Festuca spp.)

NAME OF APPLICANT(S)	TEMPORARY DESIGNATION	VARIETY NAME
University of Kentucky	G1-320	Johnstone

ADDRESS *(Street and No., or R.F.D. No., City, State, and Zip Code)*
Agronomy Department: Agricultural Science Ctr-N:
Lexington, KY 40546-0091

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PVPO NUMBER 8300154

Place the appropriate number that describes the varietal character of this variety in the boxes below. Use leading zeroes when necessary (e.g., [0 8 9] or [0 9]). Characteristics described, including numerical measurements, should represent those that are typical for the variety. Measured data should be for SPACED PLANTS. Royal Horticultural Society or any recognized color fan may be used to determine plant colors; designate system used: _____. Describe location of test area, conditions and number of plants used Lexington, Ky. spaced plants and sod; 30 plants.

1. SPECIES: (With comparison varieties for use below — use varieties within species of application variety)

[19]

1 = *F. arundinacea* (Tall): 11 = Alta, 12 = Fawn, 13 = Goar, 14 = Kentucky-31, 15 = Festal, 16 = S.170, 17 = Rebel, 18 = Manade, 19 = Kenhy, 20 = Missouri 96

2 = *F. pratensis* (Meadow): 21 = Ensign, 22 = Trader, 23 = Beaumont, 24 = Admira, 25 = Comtessa

2. CYTOLOGY:

[4 2] Chromosome Number

3. ADAPTATION: (0 = Not Tested; 1 = Not Adapted; 2 = Adapted)

[2] Transition Zone [ ] West [ ] Other *(Specify)* _____

4. MATURITY: (Date First Headed, panicle emergence) Location(s) of Trial(s) _____

[4] Maturity Class:

1 = Very early ( ) 2 = Early (Alta, Fawn, S.170) 3 = Medium early (K31, Falcon)
4 = Medium late (Barundi, Rebel, Ensign, Kenhy) 5 = Late ( )

Date Headed _____

[ ] Days earlier than . . . . . [ ]
Maturity same as . . . . . [1 9] Comparison Variety
[ ] Days later than . . . . . [ ]

5. PLANT HEIGHT (Average of 10 tallest culms):

[1 0 9 8] mm Height (at maturity to top of panicle)

[ ] mm Shorter than . . . . . [ ]
Mature Height same as . . . . . [1 9] Comparison Variety
[ ] mm Taller than . . . . . [ ]

[ ] mm Height (at ear emergence)

[ ] mm Shorter than . . . . . [ ]
Emergence height same as . . . . . [ ] Comparison Variety
[ ] mm Taller than . . . . . [ ]

14

5. PLANT HEIGHT: (Continued)

[ ][ ][ ] mm Internode length (spring)

[ ][ ] mm Shorter than . . . . . [ ][ ]

Internode same as . . . . . [ ][ ] Comparison Variety

[ ][ ] mm Longer than . . . . . [ ][ ]

[ ][ ][ ] mm Width of plant (at ear emergence)

6. GROWTH HABIT (Mature):

[2] 1 = Erect, foliage stiff-upright (Kentucky 31) 2 = Semi-erect (Beaumont, Rebel) 3 = Lax (Aberystwyth S.53)

7. RHIZOMES (Pseudo):

[ ][ ][ ] mm Length [2] 1 = Absent 2 = Rare (Rebel) 3 = Common

8. LEAF BLADE:

[3] Color: 1 = Light Green (Roa) 2 = Medium Light Green (Beaumont, Kentucky 31) 3 = Medium Dark Green (Rebel) 4 = Dark Green ( )

[2] Anthocyanin: 1 = Absent 2 = Present [ ] Hairs (Basal) 1 = Absent 2 = Present

[2] Margins: 1 = Smooth 2 = Semi-rough 3 = Rough

[4] Width Class: 1 = Fine ( ) 2 = Medium Fine (Rebel, Monaco) 3 = Medium Coarse (K-31, Barundi) 4 = Coarse (Kenhy) 5 = Very Coarse (Hazel)

[0][9][6] mm Length (Flag Leaf)

[ ][ ] mm Shorter than . . . . . [ ][ ]

Blade length same as . . . . . [1][9] Comparison Variety

[ ][ ] mm Longer than . . . . . [ ][ ]

[0][5][0] mm Width

[ ][ ] mm Narrower than . . . . . [ ][ ]

Blade width same as . . . . . [1][9] Comparison Variety

[ ][ ] mm Wider than . . . . . [ ][ ]

9. LEAF SHEATH:

[2] Anthocyanin (seedling): 1 = Absent (Kentucky 31) 2 = Present (Kenhy, Forager)

[2] Auricle Hairiness: 1 = Absent 2 = Present

10. PANICLE (Mature Plant):

[2] Shape: 1 = Narrow-tapering 2 = Ovate 3 = Oblong 4 = Other *(Specify)* _____

[1] Type: 1 = Open 2 = Intermediate 3 = Compact (appressed)

[1] Orientation: 1 = Erect 2 = Nodding

[1] Branch Pubescence: 1 = Glabrous 2 = Pubescent

[1] Anther Color:

[2] Glume Color (At 50% Flowering):

1 = Yellowish Green 2 = Green 3 = Bluish Green 4 = Purplish 5 = Reddish 6 = Other *(Specify)* _____

10. PANICLE: (Continued)

184 mm Length (from base of panicle branch to the tip)

	mm Shorter than	
	Panicle length same as	19
	mm Longer than	

Comparison Variety

11. PALEA:

HAIRS (On keels or margins): 1 = Absent 2 = Short (Missouri 96) 3 = Long ( )

12. LEMMA:

1 HAIRS: 1 = Absent (Kenhy) 2 = Several 3 = Many (Missouri 96)

mm Lemma Length (Mature)

	mm Shorter than	
	Lemma length same as	19
	mm Longer than	

Comparison Variety

mm Lemma Width

	mm Narrower than	
	Lemma width same as	19
	mm Wider than	

Comparison Variety

AWNS: 1 = Absent (Beaumont) 2 = Present (Falcon, Barundi)

mm Awn Length

	mm Shorter than	
	Awn length same as	19
	mm Longer than	

Comparison Variety

13. SEED (With Lemma & Palea):

2569 mg per 1000 seed

	mg per 1000 seed less than	
	Seed weight same as	19
	mg per 1000 seed more than	

Comparison Variety

14. DISEASE, INSECT, AND NEMATODE REACTION (0 = Not Tested; 1 = Susceptible; 2 = Resistant)

0	Melting-out *Drechslera poae* (*Helminthosporium vagans*)	0	Blind Seed *Gloeotinia temulenta*
0	Leaf Spot *D. siccans*	0	S. Patch *Sclerotinia homoeocarpa*
2	Net Blotch *D. dictyoides*	2	Stripe Smut *Ustilago striiformis*
0	Brown Patch *Rhizoctonia solani*	0	O. Patch *Ophiobolus gramminis*
0	C. Leaf Spot *Cercospora fectucee*	0	T. Blight *Typhula incarnata*
0	Pink Snow Mold *Fusarium nivale*	0	Pythium Blight *Pythium spp.*
2	Silver Top *F. tricinctum, F. roseum*	2	Powdery Mildew *Erysiphe graminis*
2	Crown Rust *Puccinia coronata*	0	Nematode _____

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14. DISEASE, INSECT, AND NEMATODE REACTION: (Continued)

☐ Insect _____

☐ Other _____

☐ Other _____

15.

[2] PHOTOPERIOD: 1 = Non-sensitive 2 = Sensitive

16.

[2] WINTER HARDINESS: 1 = Susceptible 2 = Resistant

17. GIVE VARIETY OR VARIETIES THAT MOST CLOSELY RESEMBLE THE APPLICATION VARIETY. For the following characteristics indicate Degree of Resemblance by placing in the column marked, D.R., one of the following numbers:

1 = Application variety is less than comparison variety 2 = Same as
3 = More than, better, greater, darker, more disease resistant, etc.

CHARACTER	VARIETY	D.R.	CHARACTER	VARIETY	D.R.
Leaf Width	Kenhy	2	Leaf Color	Kenhy	3
Panicle Color	Kenhy	2	Panicle Shape	Kenhy	2
Seed Size	Kenhy	2	Cold Injury	Kenhy	2
Winter Color	Kenhy	2	Heat	Kenhy	2
Shade Tolerance	Kenhy	2	Disease*	Kenhy	3
Drought Tolerance	Kenhy	3			

* *Specify each disease evaluated.*

18. ADDITIONAL DESCRIPTION: (Use additional sheets as required)

Describe all characteristics that cannot be adequately described in the form above in Exhibit D. Comparative varieties should be used as may be appropriate, such as for disease. Append all comparative trial and evaluation data, including measured characters, environmental, and disease tests.

See Exhibit D.