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J. W. Holloway

J. M. Anderson

William A. Pund

W. D. Robbins

R. W. Rogers

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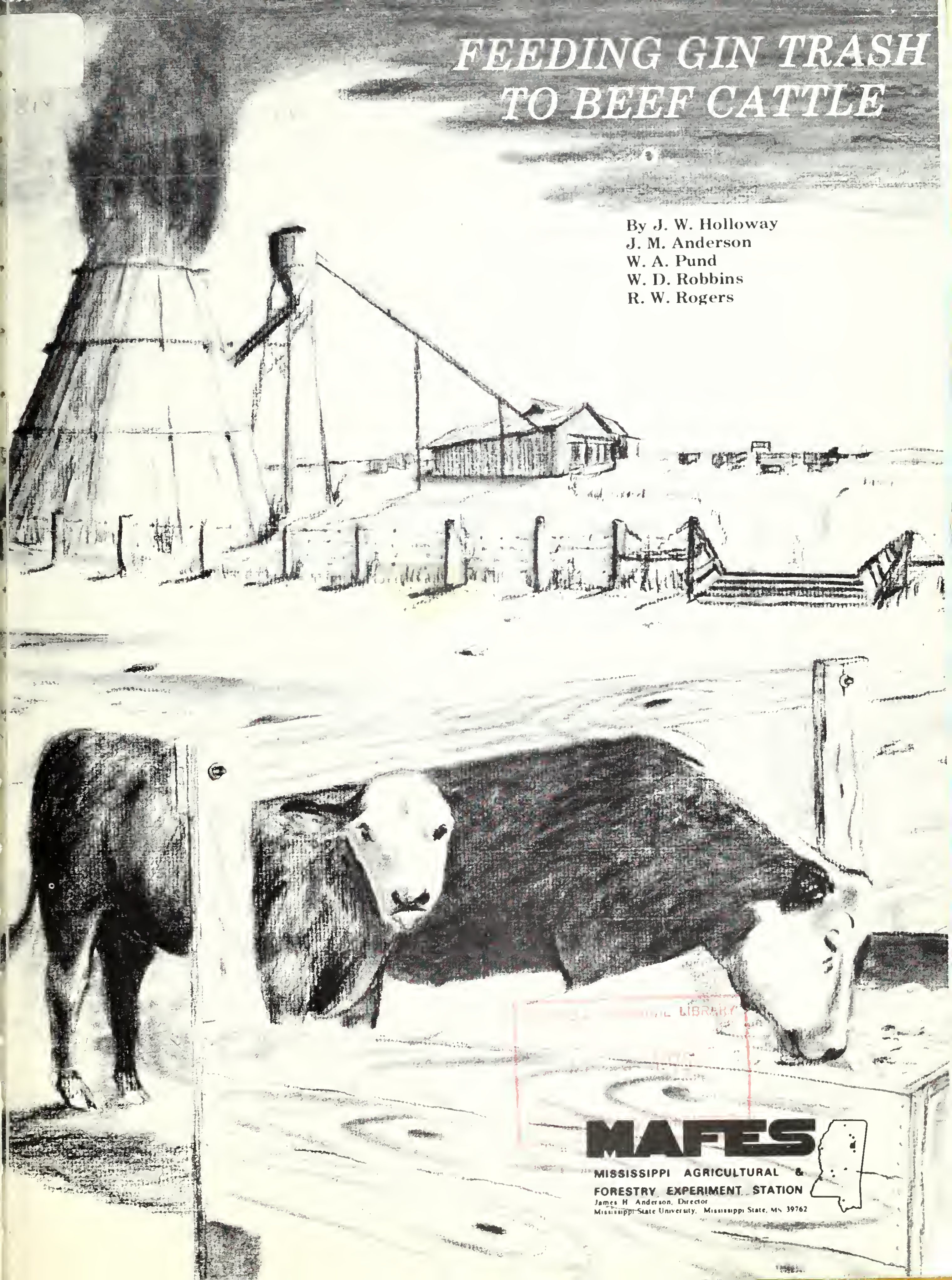

MAFES
MISSISSIPPI AGRICULTURAL & FORESTRY EXPERIMENT STATION
James H. Anderson, Director
Mississippi State University, Mississippi State, MS 39762

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Bulletin 818

FEEDING GIN TRASH TO BEEF CATTLE

By **J. W. Holloway,** Assistant Animal Scientist
J. M. Anderson, Agricultural Economist
W. A. Pund, Former Animal Husbandman
W. D. Robbins, Research Assistant
R. W. Rogers, Animal Scientist.

Mississippi Agricultural and Forestry Experiment Station
Mississippi State University

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Recent laws for environmental protection have increased interest in economical means for disposing of gin trash. Disposal methods that prevent atmospheric contamination with dust and smoke and the contamination of cropland with weed seed and disease-producing organisms are needed.

Pelleted gin trash from stripper-harvested West Texas cotton is considered to be approximately nutritionally equivalent to cottonseed hulls. Mississippi Delta gin trash has been shown to possess some nutritional value (Essig, 1964; Morrison, 1972; and Anderson, *et al*, 1973). Gin trash from picker harvested Mississippi Delta cotton is much higher in motes (cellulose) than is that of stripper harvested West Texas cotton and a higher nutritive value of Mississippi gin trash appears probable. Anderson *et al.* 1973, however, found that cattle fed pelleted Mississippi gin trash grew at approximately the same rate as cattle fed pelleted West Texas gin trash.

The major problem with feeding gin trash to cattle is the possibility of animals becoming unfit for human consumption as the result of accumulation of pesticide residues in animal tissues.[1]

The purpose of the research reported herein was to determine the feasibility of utilizing gin trash as a wholesome source of available energy for finishing steers.

Materials and Methods

A study utilizing trash in a growing ration for steers was initiated in December 1972. Thirty steers were studied in three phases: Phase 1, a 125-day experimental period; Phase 2, a 207-day summer growing period; and Phase 3, a 75-day finishing period. During all phases steers were allowed free access to trace mineralized salt. All steers were fed once daily and daily comsumption was recorded except for steers on pasture.

Phase 1---The study was designed to compare the results of feeding gin trash with those of feeding intermediate sorghum silage (DeKalb variety FS-24 to which 0.5% Limestone had been added at the time of ensiling). The steers were allotted by weight and breed to five groups. All steers were fed 0.9 pound of cottonseed meal/head/day plus free choice intake of different additional feedstuffs for each group (treatments 1 through 5):

Treatment 1. Sorghum silage.

Treatment 2. Sorghum silage and gin trash.

Treatment 3. Gin trash plus 4 pounds of ground corn/head/day.

Treatment 4. Gin trash.

Treatment 5. Gin trash plus 3 pounds of ground corn/head/day with 2 pounds of activated charcoal/head/day added in an attempt to reduce absorption of DDT.

Phase 2---The steers were removed from the experimental feed lot and randomly allotted within treatment to either a Coastal Bermudagrass pasture or a slab-floor feedlot. The steers in the feedlot were allowed free choice intake of high-cut corn silage (harvested six inches below the ear) to which 0.5% urea and 0.5% limestone had been added at the time of ensiling.

Phase 3---All steers were placed in a slatted-floor feedlot and fed the same finishing ration (Table 1).

Steers were weighed monthly and at the beginning and end of each phase. Perianal fat biopsies also were taken at the beginning and end of each phase by administering a local anesthetic to produce spinal blockage, removing from 2 to 10 grams of fat tissue and closing the incision with a stitch.

All steers were slaughtered in a commercial packing plant at the end of the 75-day finishing period. Postmortem perianal fat samples

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[1] As a result of changes in regulations regarding its use, DDT may now be a less important problem. However, during the period of the research (1972-73) DDT residues were a major concern.

Table 1. Finishing Ration of Steers Fed Experimental Rations for 125 Days.[1]

Feedstuff	As Fed Basis	D.M. Basis
	- - -Percent- - -	
High Cut Corn Silage ensiled with 0.5% urea and 0.5% limestone	30.27	14.88
Ground #2 shelled corn	61.54	74.80
Cottonseed Meal (41% crude protein)	7.69	9.61
Limestone	0.50	0.70

[1]Experimental Rations Were:

Treatment 1. Sorghum silage.

Treatment 2. Sorghum silage and gin trash.

Treatment 3. Gin trash plus 4 pounds of ground corn/head/ day.

Treatment 4. Gin trash.

Treatment 5. Gin trash plus 3 pounds of ground corn/head/day and 2 pounds of activated charcoal/head/day.

were taken from the chilled carcasses and a liver sample was taken within 1 hour after slaughter. Fat and liver samples were frozen and stored in glass jars at -15°F until chemically analyzed.

Fat and feed samples were analyzed for DDT, DDD, DDE, Dieldren, Aldrin, Toxaphene and Methyl parathion. Feed and liver samples were analyzed for elemental arsenic. Carcass data were obtained with the cooperation of a USDA meat grader.

One steer was removed from the test because of sickness not attributable to treatment. General emaciation of some steers at the end of the gin trash feeding phas made it impossible to obtain adequate fat samples. Missing dat were estimated and statistica analysis was accomplished b procedures outlined by Steel an Torrie (1960).

Results and Discussion

Feed Chemical Analyses--Gin trash pesticide residues varied markedly between sites with DDT levels ranging from 2.59 to 6.53 ppm and toxaphene ranging from 7.77 to 18.34 ppm (Table 2). This is in agreement with Anderson *et al* (1973). Of the other feedstuffs used in this study cottonseed meal with 0.36 ppm elemental arsenic was the only one with more than token levels of pesticide residues. The arsenic levels in gin trash were substantially lower than values reported by Miller (1973) for Texas gin trash.

Table 2. Pesticide Content of Feeds[1] in Experimental, Growing and Finishing Rations.

Feed	DDT	DDD	DDE	Toxaphene	Arsenic
	---------------ppm---------------				
Gin Trash Site 1	3.80	0.00	0.37	15.00	0.65
Gin Trash Site 2	6.53	0.00	0.38	18.34	0.69
Gin Trash Site 3	2.59	0.11	0.25	7.77	0.49
Sorghum Silage	0.12	0.20	0.05	1.61	0.08
Corn Silage	0.02	0.22	0.02	0.00	0.12
Cottonseed Meal	0.01	0.00	0.00	0.00	0.36
Shelled Corn (#2)	0.01	0.00	0.01	0.00	0.11

[1]As fed dry matter basis.

The proximate analysis of gi trash (Table 3) indicates potentia nutritive value with 30.5% nitroge free extract (soluble carbohydrate 3.5% ether extract (fat, oils, an pigments) and 10.2% crude protei (N x 6.25). However, it containe 39.7% crude fiber (insoluble ca bohydrate), components of whic may be chemically or physicall combined with the more solubl components causing reduce nutritive value.

Feed Consumption an Conversion--Steers fed corn grai consumed more dry matter tha other steers; steers in othe treatments consumed simila amounts of dry matter (Table 4 Steers fed rations composed mostl of gin trash were less efficient i conversion of dry matter to gai

ble 3. Proximate Analysis of Feeds[1] in Experimental, Growing and Finishing Rations.

ed	Water	Ash	Crude Protein	Crude Fiber	Ether Extract	Nitrogen Free Extract
				%		
n Trash Site 1	9.93	11.83	8.51	34.65	3.35	30.75
n Trash Site 2	7.60	5.23	11.91	43.00	3.85	28.39
n Trash Site 3	7.13	5.90	10.10	41.45	3.15	32.28
rghum Silage	67.50	—	2.55	7.53	—	—
gh Cut Corn Silage	60.60	—	3.98	7.90	—	—
ttonseed Meal	8.50	6.58	46.75	9.40	1.63	27.15
elled Corn (#2)	10.68	1.73	9.60	4.23	4.82	68.97

s fed dry matter basis.

ble 4. Daily Feed Consumption of Steers on Experimental Rations.

	Treatment[1]									
	1		2		3		4		5	
	As Fed	Dry	As Fed	Dry	As Fed	Dry	As Fed	Dry	As Fed	Dry
					Pounds					
ermediate orghum Silage	28.5	9.3	12.2	4.0	—	—	—	—	—	—
n Trash	—	—	6.3	5.8	8.2	7.6	9.7	8.9	8.9	8.2
ttonseed eal (41% CP)	0.9	0.8	0.9	0.8	0.9	0.8	0.9	0.8	0.9	0.8
Shelled orn	—	—	—	—	4.1	3.7	—	—	3.1	2.8
tivated harcoal	—	—	—	—	—	—	—	—	1.1	1.1
tal	29.4	10.0	19.4	10.6	13.2	12.2	10.6	9.7	14.0	12.9

ee Footnote, Table 1.

ble 5. Feed Efficiency of Steers on Experimental Rations.

	Treatment[1]				
m	1	2	3	4	5
d efficiency during perimental phase DM/lb weight gain	8.55	9.64	10.70	32.33	16.75
d intake during perimental phase DM/100 lb steer eight	2.18	2.34	2.67	2.39	2.76

e Footnote, Table 1.

(Table 5). This was especially true for steers fed gin trash plus cottonseed meal only. Steers on the charcoal, gin trash, corn ration required more dry matter for weight gain than did steers on the gin trash, corn ration. The poor efficiency of conversion of gin trash dry matter to weight gain indicates either poor digestibility or poor utilization of digested nutrients. Our results suggest that gin trash, when supplemented with 0.9 lb. of cottonseed meal has about one fourth the value, on a dry matter basis, of the variety of intermediate sorghum fed as silage.

Steer Performance---Daily gain during the experimental phase was generally poor (Table 6), and was much lower* for steers receiving gin trash as the only major energy source than for steers in other treatments. Differences between daily gain in other treatments in the experimental phase were not statistically significant but a trend existed for steers receiving larger proportions of their diet as gin trash to gain at a slower rate. The lower gains for steers receiving gin trash resulted in lighter weights at the end of the experimental phase (Table 6).

Although no differences were detected in daily gains in the summer growing phase, steers previously fed gin trash or gin trash plus corn tended to gain more rapidly than did steers fed sorghum silage or sorghum silage and gin trash.

Steers fed only gin trash and cottonseed meal during the experimental phase were apparently permanently "stunted", resulting in decreased final weight. This was also reflected in reduced daily gain when calculated over all phases. Daily gains of other treatments were similar.

Carcass Characteristics---Carcass grades ranged from USDA high good to USDA low choice (Table 7) The only carcass characteristic influenced importantly by treatment was warm carcass weight, with lighter carcass weights evident for steers fed only gin trash plus cottonseed meal.

Table 6. Performance, by Study Phases, of Steers Fed E perimental Rations.

	Treatment[1]					
	1	2	3	4	5	SE
Initial Weight, lb.	384[b]	384[b]	384[b]	386[b]	383[b]	5.1
Weight at End of Experimental Phase, lb.	531[b]	523[b]	528[b]	424[c]	481[bc]	15.
Daily Gain Experimental Phase, lb.	1.17[b]	1.10[b]	1.14[b]	0.30	0.77[b]	0.
Weight at End of Growing Phase, lb.	791[b]	749[b]	812[b]	710[b]	769[b]	29.
Daily Gain Growing Phase, lb.	1.26[b]	1.09[b]	1.37[b]	1.38[b]	1.39[b]	0.
Slaughter Weight	987[b]	980[b]	996[b]	865	973[b]	18.
Daily Gain Finishing Phase, lb.	2.33[b]	2.75[b]	2.20[b]	1.85[b]	2.44[b]	0.
Daily Gain Over all Phases, lb.	1.44[a]	1.43[a]	1.47[a]	1.15	1.41[a]	0.

[1] See footnote, Table 1.

[a] Standard error =Average amount by which each treatm mean differs from the true mean.

[bc] Means within a row not followed by a common letter dif (P<.05) from one another.

Table 7. Carcass Characteristics of Steers Fed Experimen Rations

	Treatment[1]					
Characteristic	1	2	3	4	5	SE
Warm Carcass Weight, lb.	577[ef]	545[fg]	590[e]	512[g]	580[ef]	10.
Marbling Score[b]	4.85[e]	5.22[e]	5.48[e]	4.70[e]	5.27[e]	0.
Quality Grade, USDA[c]	11.5[e]	12.2[e]	12.3[e]	11.5[e]	12.3[e]	0.
Loin Eye Area, sq. in.	10.4[e]	10.2[e]	10.6[e]	10.2[e]	9.6[e]	0.
Fat Thickness, in.	0.50[e]	0.50[e]	0.43[e]	0.38[e]	0.58[e]	0.
Yield Grade[d]	3.22[e]	3.13[e]	3.03[e]	2.80[e]	3.75[e]	0.

[1] See footnote, Table 1.

[a] Standard Error Average amount by which each treatm mean differs from the true mean.

[b] 4 = slight; 5 = small; 6 = modest

[c] 10 = average Good; 11 = high Good; 12 = low Choice; average Choice; 14 = high Choice.

[d] Calculated percent boneless, trimmed round, rib, loin chuck; 2 = 52.3%; 3 = 50.0%; 4 = 47.7%.

[efg] Means within a row not followed by a common letter di (P<.05) from one another.

**Differences between treatments noted here and elsewhere in this report are all statistically significant at the 5 percent probability level. This means that differences as large as those reported could have occurred by chance only 5 times in 100 trials.*

eticide Levels in Steers and Steer *casses*---Initial levels were ilar for all steers and were erally relatively low (Table 8). alysis of the fat samples taken the end of the experimental se revealed significant build- of DDT and DDE, but only for tments 1, 2 and 4. Steers fed y gin trash as the major energy rce experienced the greatest in- se in concentrations of these pesticides and adding charcoal to the gin trash/corn ration did not reduce absorption of pesticides significantly. Levels of Dieldrin and DDD did not change significantly during the experimental phase and no samples taken contained Endrin, Toxaphene or Methyl Parathion, either at the end of the experimental phase or at the end of subsequent phases.

Amounts of DDT, DDD, and DDE in all fat samples obtained at the end of the growing phase were well below the levels permitted for human consumption (Table 9).

The levels of pesticides in the fat from all steers were lower at the end of the finishing phase than at the beginning of the experiment. Amounts of elemental arsenic in liver samples did not differ significantly among treatments and were far below established tolerance levels.

Summary

eers fed gin trash as the major rgy source gained at slower s than did those fed sorghum silage or gin trash supplemented with sorghum silage or ground corn. The steers started on gin trash did not overcome this early deprivation in the growing and finishing phases and reached lighter slaughter weights, yielded lighter carcasses and tended to have less backfat thickness and lower yield grades than did steers started on the other experimental rations. Average rates of gain over all phases of the study, slaughter weights, and carcass characteristics of steers started on gin trash plus other sources of energy were similar to those of steers started on rations containing no gin trash.

Higher levels of gin trash in the experimental rations were associated with increased retention of DDT and DDE in the fat of steers. Addition of charcoal to the gin-trash/corn ration did not reduce absorption of pesticides significantly. Samples taken at the end of each phase of the study contained no Endrin, Toxaphene or Methyl Parathion.

All fat soluble pesticide amounts were below established tolerance levels at the end of the growing phase and were far below both initial amounts and tolerance levels when the steers were slaughtered 407 days after experimental feeding was begun.

The liver content of elemental arsenic ranged from .06 to .12 ppm and was far below tolerance levels for all rations tested.

ble 8. Pesticide Levels, By Study Phase, of Steers Fed Ex-imental Rations.

	Treatment[1]					
	1	2	3	4	5	SE[a]
ial Levels[b], ppm						
)T	1.06^{d}	1.08^{d}	0.60^{d}	0.88^{d}	1.21^{d}	0.433
)D	1.79^{d}	3.01^{d}	1.75^{d}	3.06^{d}	4.09^{d}	1.192
)E	3.95^{d}	10.28^{d}	3.56^{d}	6.28^{d}	9.07^{d}	3.290
els at End of perimental Phase[b], ppm						
)T	0.59	3.32	4.15^{d}	8.23	6.37^{d}	0.709
)D	2.22^{d}	6.80^{d}	6.35^{d}	8.03^{d}	3.48^{d}	0.933
)E	6.85^{d}	16.53^{ef}	12.97^{de}	25.57	13.48^{d}	2.844
eldrin	0.02^{d}	0.04^{d}	0.02^{d}	0.00^{d}	0.03^{d}	0.014
els at End Growing Phase[b], ppm						
)T	0.06^{d}	0.76^{d}	0.49^{d}	0.24^{d}	0.56^{d}	0.216
)D	0.00^{d}	0.02^{d}	0.02^{d}	0.00^{d}	0.00^{d}	0.014
)E	1.59^{d}	5.30^{d}	4.22^{d}	3.10^{d}	2.31^{d}	0.988
eldrin	0.06^{d}	0.02^{d}	0.01^{d}	0.02^{d}	0.01^{d}	0.010
els at End Finishing Phase[b], ppm						
)T	0.05^{d}	0.22^{d}	0.27^{d}	0.11^{d}	0.33^{d}	0.091
DD	0.00^{d}	0.00^{d}	0.00^{d}	0.00^{d}	0.00^{d}	0.000
DE	1.01^{d}	2.33^{d}	1.83^{d}	1.23^{d}	1.39^{d}	0.485
eldrin	0.00^{d}	0.02^{d}	0.02^{d}	0.01^{d}	0.01^{d}	0.010
S[c](elemental)	0.11^{d}	0.09^{d}	0.12^{d}	0.06	0.09	0.036

[1]See footnote,Table 1.

[a]Standard Error = Average amount by which each treatment differs from the true mean.

[b]DDT, DDD, DDE, and Dieldrin values refer to levels in rianal adipose tissue.

[c]Elemental AS values refer to levels in liver.

[ef]Means within a row not followed by a common letter differ .05) from one another.

Table 9. Tolerance Residue Levels of Pesticides

Pesticide	Tissue or Plant	Tolerance Level
		ppm
DDT	Bovine Fat	7
	Cottonseed	4
	Corn Grain	0
	Corn Forage	0
	Sorghum Grain	Not listed
	Sorghum Forage	Not listed
Dieldrin	Bovine Fat	Not listed
	Cottonseed	Not listed
	Corn Grain	0
	Corn Forage	0
	Sorghum Grain	0
	Sorghum Forage	0
Aldrin	Bovine Fat	Not listed
	Cottonseed	Not listed
	Corn Grain	0
	Corn Forage	0
	Sorghum Grain	0
	Sorghum Forage	0
Endrin	Bovine Fat	Not listed
	Cottonseed	0
	Corn Grain	Not listed
	Corn Forage	Not listed
	Sorghum Grain	Not listed
	Sorghum Forage	Not listed
Toxaphene	Bovine Fat	Not listed
	Cottonseed	Not listed
	Corn Grain	7
	Corn Forage	Not listed
	Sorghum Grain	5
	Sorghum Forage	Not listed
Methyl Parathion	Bovine Fat	Not listed
	Cottonseed	0.75
	Corn Grain	1
	Corn Forage	1
	Sorghum Grain	Not listed
	Sorghum Forage	Not listed
Arsenic	Bovine Liver (uncooked)	2
	Cottonseed	Not listed
	Corn Grain	Not listed
	Corn Forage	Not listed
	Sorghum Grain	Not listed
	Sorghum Forage	Not listed

Source: Code of Federal Regulation. 1973. Food and Drug Administration. Parts 35 and 40, Paragraphs 180.147, 180.131, 180.121, 135.33, 180.137, 180.135 and 180.138.

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