

# What's happened after 2 years moratorium?

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The agricultural DDT moratorium in Arizona has successfully completed its second year and is well into the third, after its beginning in January 1969. When the moratorium began Arizona had used DDT on a broad agricultural scale for 23 years. Historically cotton has been the heavy-use crop, and during the years of maximum acreage it is estimated that 4,000,000 pounds of actual DDT were being used per year.

DDT sales information provided to our Community Studies Pesticide Project by the agricultural chemical industry show that for 1965, 545,000 lbs. were used; 1966, 1,072,000 lbs.; 1967, 2,520,000 lbs.; and for the last year, 1968, 528,000 lbs. were used.

The Board of Pesticide Control, after making the DDT moratorium decision in 1969, asked the Entomology Pesticide Residue laboratory to monitor the general change in DDT residues while it was not being used. We began sampling immediately, and have continued to yearly monitor green alfalfa and soil from the same fields, and beef fat from the same feed lots. These appear to be the best indicators of DDT residue decline.

Soil and alfalfa samples were collected from the three major irrigated areas — the Salt River Valley near Phoenix, Pinal County and the Yuma mesa and valley. Desert soil samples adjacent to these areas were also collected.

Beef fat samples were removed from the left kidney of carcasses after chilling 24 hours in the slaughterhouse.

In addition, a green alfalfa residue study begun in 1967 was continued on the 60-mile Baseline Road, an east-west transect in Maricopa County. This provides a reference standard for the moratorium monitoring.

## Results

The analytical results of alfalfa, soil, desert soils and beef fat samplings during the past 2 years are shown in Tables 1-4. These actually represent the residues at the termination of three growing seasons, 1968- 1969 and 1970. The residues are expressed as total DDTR, that is, DDT

Table 1. Average DDTR residues (ppm) in green alfalfa.

Sampling Area	1967 Aug.	1969 Jan.	1969 Sept.	1970 Sept.
Baseline Rd.	.404	.102	.037	.045
Salt River Valley	—	.117	.051	.063
Pinal County	—	.088	.086	.050
Yuma County	—	.046	.210	.058
State average		.088	6.096	.054

and related metabolic or breakdown products, e.g., p,p'-DDT, o,p'-DDT, DDE and DDD.

The green alfalfa residues (Table 1) from all 4 areas appear to have leveled off at about 0.05 ppm, the inherent condition which we will have to contend with for the next several years. The Yuma residues have dropped most notably after the apparent moratorium violations reflected in the September 1969 levels.

Residues in the alfalfa soils (Table 2) all declined slightly between the 1969 and 1970 samplings. Since the

Table 2. Average DDTR residues (ppm) in soils from alfalfa fields.

Sampling Area	1969 Jan.	1969 Sept.	1970 Sept.
Salt River Valley	1.58	1.96	1.82
Pinal County	1.69	1.66	1.62
Yuma County	0.82	0.79	0.75
State average	1.36	1.47	1.39

decline is almost negligible, the suggested half-life for these soil residues is probably greater than 10 years. The desert soils (Table 3) have changed least of the two. Because the desert soil samples are taken only from the top quarter-inch, they are most subject to wind-blown surface contaminants, and may change considerably between samplings. By wind movement they in turn may become a part of the unexplained changes in DDTR found in green alfalfa.

Table 3. Average DDTR residues (ppm) in desert soils adjacent to agricultural areas.

Sampling Area	1969 Jan.	1969 Sept.	1970 Sept.
Salt River Valley	0.92	0.94	0.86
Pinal County	0.40	0.43	0.57
Yuma County	0.13	0.10	0.13

The beef fat DDTR residues (Table 4) have shown a significant drop from the 1968 level, 0.49 now vs. 0.96 ppm. We now believe that kidney beef fat is probably

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# Navajo Lamb Income Increases

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at Bidahochi, Arizona. Of this total, 870 were lambs and 42 were ewes. These lambs were sorted into 11 uniform sale lots on the basis of weight, quality and condition (Table 3). The six lots designated as "other" included black, crippled, and other lambs with undesirable characteristics which substantially reduce the market price. For these reasons, these animals were excluded from the price analysis.

Prices received at the auction for the five uniform sale lots increased as the average weight of lambs increased (Table 2). However, except for the 27 lambs in the lightest weight group, average auction prices ranged from \$25 to \$27 per hundredweight. These prices were only slightly less than the average monthly prices of \$27 to \$28 received by all Arizona sheep producers.

**Conclusions of Study** — Average prices received for a majority of the lambs sold at the auction exceeded average prices received in direct sales by approximately \$2.50 to \$4.50 per hundredweight. Also, higher prices were received for heavier lambs at the auction, whereas weight had no apparent effect on prices received in direct sales to local buyers.

Sheep producers on the Navajo Reservation can get a higher price for their lambs if they are willing to (1) assemble their lambs at one point (in this case at auction pens equipped with scales), (2) cull and sort them into

TABLE 3 Number of Lambs Sold at Auction, by Weight Group, Navajo Indian Reservation, October 1969

Weight Group (pounds)	Number of Lots	Number of Lambs
49 or less	1	27
50 - 69	1	106
70 - 84	2	519
85 or more	1	181
"Other"	6	37
<b>Total</b>	<b>11</b>	<b>870</b>

uniform lots, (3) provide feed and water, and (4) auction them to the highest bidder.

They must strive to accomplish this at the lowest possible cost, attempt to keep shrinkage at a minimum, and provide buyers with the type and quality of lambs desired.

Finding that prices received at the auction were slightly below average monthly prices received by all Arizona sheep producers suggest, although not conclusively, that the average quality and/or weight of reservation lambs may be slightly below the state average. If so, it may be worthwhile for reservation producers to explore the possibilities for up-grading their breeding stock and improving other facets of sheep management.

## Agricultural Residues . . .

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the best indicator of DDT use in agriculture, when all feed consumed by the animals is grown locally, as in Arizona.

The DDTR residues now found in Arizona alfalfa, soils, and beef fat are primarily DDE, the very persistent metabolite. This indicates that any problems arising in the future will be attributable to the "universal contaminant," DDE, rather than the parent compound, DDT.

In summary, the 1969 and 1970 moratorium on agricultural use of DDT was essential, timely and very effective. Alfalfa residues declined significantly in these 2 years, to a probable constant level of 0.05 ppm. Beef fat residues also dropped in 1970 to one-half the 1969 level. Soil residues have changed almost negligibly, suggesting

Table 4. DDTR residues in beef fat from selected Arizona feed lots.

Feed Lot No. <sup>1</sup>	Residues in PPM		
	1968 Nov.	1969 Dec.	1970 Sept.
1	1.34	0.59	0.60
2	1.07	1.93	0.45
6	1.15	0.75	2
9	0.80	0.71	—
12	0.47	0.84	0.46
<b>Average</b>	<b>0.97</b>	<b>0.96</b>	<b>0.49</b>

<sup>1</sup> Average of five animals per feed lot.

<sup>2</sup> Samples not available during sampling period.

an approximate half-life longer than 10 years. These residues consist mostly of the very persistent DDE, indicating that any future problems will be due to this "universal contaminant," instead of the parent DDT.

### Sorghum Characteristic

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than did the later two plantings, which required only 9 or 10 days for emergence.

In conclusion, it would appear that planting grain sorghum types from the middle of March to the first of April would result in about the maximum seasonal yield of grain. This planting date would maximize the probability of a stand by reducing the time the crop is in the seedling stage. A dual purpose type planted for grain at this time would likely be too tall to combine in addition to the extra fertilizer and water needed to produce the forage-type plant. Earlier dates of planting tie up the land longer, with greater risks for stand survival with only small gains in yield. In view of recent sorghum production problems in the Yuma area, May and June plantings have become increasingly hazardous for growing a good crop with good grain yield. In summary the March or April planting period would appear to be most advantageous.