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DEVELOPMENTS IN THE USE OF SWINE FEED ADDITIVES

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We in the swine industry are in the business of producing food. The consumer of pork products in America, and more recently the world consumer, expects us to produce wholesome food free of any contamination that may be injurious to his or her health. Thus we must keep our customer, the pork consumer, in mind in anything we do in the swine industry, especially when using feed additives.

The American consumer is learning to accept pork more readily than in past years. There are several reasons for this change, but two reasons I will mention are, 1) the excellent job of improving the quality of our product, and 2) the promotion of pork by organizations like the National Pork Producers Council and its state affiliates like the South Dakota Pork Producers Council. Consequently nothing should be done with feed additives that will counteract the acceptance that pork has attained.

Feed additives in swine rations have been generally available since the early 1950's. The use of swine feed additives has increased since those early days until it is now estimated that 90 percent of all swine raised in the United States receive medicated feed sometime before they go to market.

The wide acceptance of feed additive use can be attributed to the established benefits of:

A. Increasing growth rate
B. Improving feed conversion
C. Reducing mortality and morbidity from clinical or subclinical infections (disease control)

The extensive use of feed additives has caused some concern about potential harmful effects due to the development of resistant strains of organisms. We realize that this must be a concern of the swine industry, even though we have used some of these feed additives nearly 30 years. However, by now fear should have changed to rational thinking. Adequate evaluation of the potential harmful effects should be contrasted with the proven health and economic benefits.

It has been suggested that antibiotics are losing their effectiveness with continued use. The table below summarizes the effect of tetracyclines over three decades when fed to swine at different stages of life.

Continued Effectiveness of Tetracycline in Swine

	Average daily gain (% improvement)			Feed/gain (% improvement)		
	Starter	Grower-developer	Growing-finishing	Starter	Grower-developer	Growing-finishing
1950-56	8.70	17.36	9.40	5.45	6.27	4.55
1957-66	11.69	6.02	5.88	7.93	1.95	1.14
1967-77	10.63	5.97	4.55	2.99	2.42	0.92

Source: V. W. Hays, "Effectiveness of Feed Additive Usage of Antibacterial Agents in Swine and Poultry," prepared for the Office of Technology Assessment, U. S. Congress, 1978 (typescript), tables 5, 26, and 27.

Those antibiotics found to be effective as feed additives in the 1950's are still effective in the 1970's. The magnitude of the response varies from experiment to experiment; caution must be used in basing conclusions on one experiment.

Use Proper Levels of Feed Additives

Each feed additive that is approved by the FDA for use in swine feeds has been researched for effectiveness as well as safety for each claim or use that is listed on the label. It is important that the proper level of the feed additive be used to assure its effectiveness. The old axiom, "If a little is good, more is better," is not true; in fact, it could be detrimental.

Under the FDA Current Good Manufacturing Practices regulation and the South Dakota Commercial Feed Law, feed manufacturers and custom feed mixers are not permitted to use feed additives at levels that are not approved. To do so would put them in violation of the regulations, regardless of who made the recommendation.

It is, therefore, important that mixing directions for any medicated concentrate or medicated premix be followed. The mixing directions are always printed on the tag or label of the concentrate or premix so the proper level of the feed additive will be in the complete feed. If there are any questions concerning the proper level of feed additives, the supplier should be contacted.

Withdrawal Times

Whenever a feed additive is approved by the Food and Drug Administration the need for a withdrawal time is established to assure that none of the feed additive will produce residue in the meat, milk or eggs that we eat. Some feed additives require no withdrawal while others must be withdrawn for an established time to eliminate tissue residue. Withdrawal times are established based on research data that is supplied to the FDA by the sponsor of the feed additive. The established withdrawal times vary from one feed additive to another, so it is important that you check the label of the feed. If you are not sure of the withdrawal time, ask your feed supplier. Table 1 gives the current withdrawal times on most of the commonly used swine feed additives.

We have noted that whenever profit margins in swine feeding are narrow some producers will cut back on essential nutrients (protein, vitamins, minerals, etc.) in order to reduce cost per pound of feed. This often results in reduced gains, and then as pigs approach market age feed additives are added in an attempt to compensate for their earlier reduced gains. This often results in violations of withdrawal times before slaughter and the possibility of illegal residues.

The Sulfa Problem

The swine industry has a serious problem with one of the commonly used feed additives--sulfamethazine. Sulfamethazine is used in combination with chlortetracycline and penicillin in swine rations, and CSP is an excellent combination. The problem is that the USDA meat inspectors are picking up sulfa residues in liver tissue in slaughtered swine above the permitted level of 0.1 part per million.

Several reasons have been given for the high number of sulfa residues that are being reported. Most of the reasons are probably valid:

Insufficient withdrawal time (15 days required)
Withdrawal feed contained sulfamethazine contamination
Sulfa picked up from manure left in the lot or pen

Most pork producers have learned how sulfa contamination comes about and have been trying to avoid it. They have made a real effort to eliminate the causes. Some producers, however, apparently have chosen to ignore the accepted procedures for avoiding sulfa contamination.

The Future of Feed Additives

I am sure that swine producers will continue to use feed additives when needed and benefits are derived. However, on the other hand, we do note a trend among progressive swine producers to be more selective in using high levels of feed additives except when there is a demonstrated need. This we feel is good and should certainly lead to fewer problems with illegal tissue residues.

There are a lot of inconsistencies in the way swine producers can use the various swine feed additives. For example, you can use a concentrate containing up to 2600 grams of Lincomycin per ton, but a concentrate containing Carbadox cannot contain over 500 grams per ton. These inconsistencies have resulted from the original drug application that was submitted to FDA when the drug was approved.

In an attempt to correct the inconsistencies in the feed additive regulations the FDA conducted a six month study of the present regulations and came up with a series of recommendations which are planned to be implemented over the next three years. Although the final regulations will probably not be published until June 1980 the report does give most of the detail that will be in the regulations.

The principal recommendations are:

1) Make public health protection the major objective for regulating medicated feeds.
2) Establish four drug categories based on risk of potential residues. These categories, in turn, will permit classifying the new drug status of medicated feed articles by type and by drug level.
3) Require pre-approval inspections and regular periodic inspections only for firms using "human risk" drugs.

The four proposed drug categories are based on the risk of potential residues in human foods.

Category I drugs are considered to have the highest degree of human safety. A person mixing feed may use a premix containing up to 200 times the highest approved level in a complete feed without an approved medicated feed application. An example in this category is Tylosin where the highest approved level is 100 grams per ton. Therefore 200 times 100 grams per ton is 20,000 grams per ton (10 grams per pound), the highest level premix that can be used without an approval from FDA.

Category II drugs also have a high degree of safety but are approved for a single species only. A person mixing feed may use a concentrate containing up to 80 times the highest approved level for a complete feed. Streptomycin is one of the swine feed additives that fits into this category.

Category III are those drugs approved for one species and have withdrawal times but are not considered high risk drugs. A person mixing feed may use a concentrate containing up to 40 times the approved level for a complete feed without an approval from the FDA. Sulfamethazine is in this category, which means the maximum level of sulfamethazine that can be in a concentrate is 4000 grams per ton, and the concentrate will be used at the rate of 50 pounds per ton of complete feed.

Category IV are those drugs that are considered high risk drugs. A person mixing feed may use a concentrate containing 10 times the level approved for a complete feed without an approved medicated feed application from the FDA. This means that 200 pounds of concentrate per ton of feed is the least amount that could be used. Carbadox is one of the swine feed additives that falls in this category.

The new regulations will be quite complex and there may be some slight changes before the final regulations. I feel the new regulations will be more meaningful than the present regulations and will help the swine industry to produce wholesome pork that our customers--the world consumer--expects.

Table 1.

FEED ADDITIVE WITHDRAWAL TIMES FOR SWINE

Feed Additive	Trade Name	Withdrawal Time
Arsanilic Acid	--	5 days
Bacitracin (all forms)	Bacitracin MD, Baciferm	none
Bambermycins	Flavomycin	none
Carbadox	Mecadox	10 weeks
Chlortetracycline	Aureomycin, Chlorachel, CTC	none
Chlortetracycline, Sulfamethazine, Penicillin	Aureo SP-250, Chlorachel-250	15 days
Chlortetracycline, Sulfathiazole, Penicillin	CSP-250	7 days
Dichlorvos	Atgard	none
Ethylene Diamine Dihydriodide	EDDI	none
Erythromycin	--	none
Furazolidone	NF-180, Furox	5 days
Hygromycin	Hygromix	15 days
Levamisole Hydrochloride	Tramisol	72 hours
Lincomycin	Lincomix	6 days
Neomycin	Neomix	20 days
*Neomycin, Oxytetracycline	Neo-Terra	5 or 10 days
Nitrofurazone	NFZ, Amifur	5 days
Oleandomycin	OM-5	none
Oxytetracycline	Terramycin	none except 500 g/T-5 days
Penicillin	--	none
Penicillin-Streptomycin	Pro Strep, Pen-Strep, Strepcillin	none
Piperazine	--	none
Pyrantel Tartrate	Banminth	24 hours
Roxarsone	3-Nitro	5 days
Thiabendazole	TBZ	30 days
Tylosin	Tylan	none
Tylosin, Sulfamethazine	Tylan-Sulfa	15 days
Virginiamycin	Stafac	none

*less than 140 grams Neomycin per ton - 5 days, more than 140 grams Neomycin per ton - 10 days.

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