Dipping Is Easy . . . With Right Vat Design

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Recent scabies outbreaks, and strict new regulations have made it necessary for many people to build a dipping vat. In order to avoid having a hastily built mess which you will regret later, you should do some planning before you build.

A new dipping vat must be integrated into your processing program. In order to keep scabies out of your yard, the animals should be dipped upon arrival, unless they were dipped at the point of origin.

The addition of a dipping vat to your program may make it necessary to modify your worming and medication, to prevent a dangerous drug interaction effect between the dip chemical and medicines and sprays your cattle have been treated with prior to dipping.

Sometimes the dip chemical gets blamed for making a group of cattle sick. What usually makes the cattle sick is a toxic interaction effect between dip chemicals and other medicines the cattle have been treated with such as a wormer.

Before you use a dipping vat for the first time you must review your dipping and medication program with your veterinarian, to insure that the dip chemical and your medicines are compatible.

Another thing you need to consider is protecting your cattle from the wind during cold weather. If your feedlot is located in a cold part of the country a wind break should be built around the dip pen area.

The animals should be provided with shelter from the wind until they are completely dry. Do not put the animals in a tightly closed building. Wind makes it cold. If it is 20 degrees outside and the wind is blowing 15 miles per hour the chilling effect on the animal will be equal to minus 5° F.

There are three basic types of dipping systems which are approved by the USDA for scabies control. They are the jump in vat, hydraulic cage vat, and the box sprayer (Spray Dip).

Simply spraying the cattle with a hand held sprayer is not legal for scabies control, because the underparts of the animal can be missed. For official scabies control the animal must be completely immersed in the dip.

It is important to choose the best system for your operation. The most inexpensive system is the box sprayer. It consists of a box which is used to confine the animal while nozzles on the sides, top and bottom completely saturate it.

The width between these two anti-bunch gates can be adjusted so that only one animal at a time can enter this jump in vat. A sloping hold down rack prevents the animals from wildly leaping and it makes them dunk their heads under the water.

This system is recommended for treating small numbers of cattle only. It is quite slow and only one animal can be treated at a time.

An advantage of the box sprayer is that it can be mounted on a portable trailer. Several small cattle feeders could purchase one and share it. The box sprayer is also useful at livestock shows and fairs. It is of the utmost importance to keep the box sprayer clean to prevent plugging of the nozzles.

The hydraulic cage vat is a popular dipping system for small to medium sized operations. This system is recommended for operations where cattle are dipped infrequently and fewer than 500 head would be dipped on any one day.

It consists of a wire mesh cage which is hydraulically lowered into the dipping bath like an elevator. The cage is raised after the animal is completely immersed. The animals enter the cage one at a time.
A downward sloping hold down rack prevents the animals from jumping up. The hold down rack also insures that the animal's head will go all the way under the solution practically every time.

The entrance is also designed such that cattle will enter the vat with a minimum of excitement. Wild leaping and balking problems are greatly reduced.

Each animal enters the vat by walking down a gradual declining cleated ramp, which provides good footing. This ramp is on a 25 degree angle and it ends at the water line. The purpose of the gradual declining ramp is to orient the animal's center of gravity towards the water. A steep drop off which is on a 45 degree angle is hidden underneath the surface of the water.

Since the animal can stand on the gradual declining ramp without slipping, he does not get scared and try to back out. The gradual ramp appears to just continue on into the water, and when the animal takes one more step on what he thinks is a gradual ramp, he steps out over the steep drop off. As soon as he steps off the gradual ramp he will fall into the water without a fuss, and minimum splashing.

The vat entrance at McElhaney's is also equipped with two anti-bunch gates so that only one animal can enter the vat at a time. Controlling the flow of cattle into a jump in vat is critical to prevent cattle from jumping on top of each other.

The anti-bunch gates form a smooth funnel and they are located on each side of the single file chute. The gates are seven feet long and are constructed from 14 ga. steel and pipe.

Proper design of a jump in vat is essential to make the vat safe and effective. I recently designed a jump in dipping system for McElhaney Cattle Co. in Wellton, Arizona, and Red River Feedyard in Stanfield, AZ. Three people can dip 600 cattle per hour.

The leadup entrance into the vat was designed by the author to force the cattle to enter the vat one at a time in an orderly manner and to prevent wild leaping and "cannon-ballng."

This diagram illustrates a cutaway of the entrance to a jump in dipping vat which was designed by the author. A cleated ramp on a 25 degree angle orients the animal's center of gravity over the water. The animal will fall into the water with a minimum of balking when it steps out over the steep drop off. An adjustable hold down rack insures that their heads will go under and it prevents cattle from jumping on top of each other.

This system requires either electricity, a gas engine or the hydraulic system of a tractor to run it. It is much slower than a jump in vat, but the system will work extremely well in operations where each animal is dipped after it has been processed through the squeeze chute.

A disadvantage of the hydraulic cage vat is high maintenance. Good maintenance of the lifting mechanism is essential for the system to operate safely and efficiently.

Two other advantages of the cage vat over the jump in vat are lower initial installation cost and less dip chemical for charging it. The cage vat requires 1,600 gallons to charge it, whereas the jump in vat requires 3,300 to 5,000 gallons per charge.

The smaller capacity offers a great economy, only when relatively few cattle are dipped because the dip chemicals become dirty and spent before they become foul from standing without being used.

The smaller capacity offers no economy when large numbers of cattle are dipped, because the vat will simply have to be charged twice as often.

The jump in vat is the system of choice when large numbers of cattle have to be dipped quickly. It is the system of choice for large feedlots, auction yards and for large scale official scabies dipping.

A round crowding pen with high solid sides is an efficient method to crowd cattle into the single file chute which leads to a dipping vat. The transition between the single file chute and the crowding pen must be gradual and smooth to prevent bunching and jamming.
The pair of anti-bunch gates work on a similar principle as the "trigger trap" oneway gates which are used on ranches to trap wild cows at the waterhole.

The opening between the ends of the gates is adjusted for the width of a single animal. The gates act like a valve and they can be used to slow down incoming cattle if they are coming too fast.

Quality concrete work is an absolute must when you construct either a jump in or a hydraulic cage vat. Reinforcing steel should be placed in the walls of both jump in and cage type vat pits.

Both types of vats require drip pens to return chemicals which drip off the cattle to the vat. The drip pens should slope one-fourth of an inch to the foot towards the vat. The drip pens should be curbed with a minimum of a six-inch high curb. For large operations where things will tend to get really wet an 8- to 12-inch high curb is recommended.

To prevent the cattle from falling down, the drip pen floor should be deeply scarred with two-inch deep grooves. An easy way to make the grooves is to push an angle iron into the concrete while it is still wet.

**Sump Recommended**

A manure and hair catching sump is recommended to prevent hair and manure from the cattle from re-entering the vat. The sump should be equipped with a valve to divert rain water which falls on the drip pens to outside the vat. It is important to prevent rain water from entering the vat.

In order to prevent a nasty mud-hole from forming around your new dipping vat, it is wise to install a two to five foot concrete apron around the pit. If splashing is a problem the apron can be curved to return splashed dip to the vat. In jump in vats, splashing can be reduced by installing a three-inch pipe splash rail along the top of the pit.

For ease of handling cattle the single file chute which leads up to the dipping vat should be curved and have high solid sides.

The leadup chute and the crowding pen should have a concrete floor so that it can be completely washed down after each use. This is important to prevent the cattle from tracking manure and dirt into the vat. The cleaner you can keep your system the longer the chemicals will last.

For ease of handling, the drip pens can be equipped with either hydraulic or air operated exit gates. This will practically eliminate having an extra person just to open exit gates and chase cattle out of the drip pens.

The leadup chute and crowding pen should be curbed to contain the wash water and direct it to a drain. The builders of many cattle working areas make no provision for containing the wash water. The water is simply allowed to run out onto the ground and create mud. The leadup chute should be sloped one-eighth of an inch AWAY from the vat, to prevent the wash water from entering the vat.

John W. Rogers with the USDA states there are only four products which can be used for official scabies dipping. They are Toxaphene, Corral, Starbar GX-118 and hot lime and sulfur. Hot lime and sulfur has to be heated to 95 to 105 degrees and it is not practical for a beef operation.

Toxaphene is one of the most inexpensive dips and it is sold under...
**Figure 1. Comparison of Dip Vat Chemicals**

<table>
<thead>
<tr>
<th>Name</th>
<th>Scabies Control Mixing Directions</th>
<th>Price *per 1000 gal. of dip</th>
<th>Chemical Life</th>
<th>Agitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoRal</td>
<td>0.3% concentration or 10 lbs. of 25% CoRal powder per 100 gallons of water.</td>
<td>$300</td>
<td>USDA requires changing every 120 days. CoRal is a very stable chemical</td>
<td>Requires a large amount of agitation to keep the wettable powder suspended in the water.</td>
</tr>
<tr>
<td>Cooper-Tox or LinTox X (toxaphene)</td>
<td>0.5% to 0.6% concentration or 3.5 to 4 quarts per 100 gallons of water.</td>
<td>$105</td>
<td>120 days</td>
<td>Requires little agitation</td>
</tr>
<tr>
<td>Starbar GX 118 (prolate)</td>
<td>0.15 to 0.20% concentration or 1 gallon per 60 gallons of water for the initial charge. Replenishment use 1 gallon per 50 gallons of water. In addition, the solution should be actified by adding 10 lbs. of Triple Superphosphate per 100 gallons of water.</td>
<td>$225</td>
<td>60 days. Prolate is less stable than toxaphene or CoRal</td>
<td>Requires moderate agitation</td>
</tr>
</tbody>
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*Price figures determined by Texas A & M University Extension Service*

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the name of Copper Tox or LinTox X. These two brands are approved by the USDA, do NOT use any other brand unless it has been specifically approved by the USDA for scabies dipping.

Toxaphene will kill ticks in addition to the scabies mites, but it will have little effect on grubs. CoRal and Starbar GX-118 will also kill grubs.

Even though CoRal and Starbar GX-118 are more expensive than Toxaphene they are usually the chemicals of choice for a feedlot dipping program because they can also be used for grub control. The chart (Figure 1) compares the different dip vat chemicals.

In order to maintain the correct concentration of dip chemicals in the vat, you must keep accurate records. The records should contain the date the vat was charged and entries should be made each time cattle are dip. You must keep track of how many cattle go through the vat.

The depth of the water should be measured before and after each dipping session so you can compensate for rain, leakage and evaporation.

It is important to calibrate the vat so that you can accurately measure the contents. The side of the vat should be marked for the full level and the ⅝ full level. When the vat drops down to the ⅝ level the chemicals must be replenished.

To determine the capacity of the vat you should calculate the gallonage mathematically. Another good method for calibrating a vat is to fill the vat repeatedly from a tank of known gallonage. This method is slow but it is super accurate and you only have to do it once.

A dipping vat is fairly simple to manage. The number one rule is to keep it clean. In any dipping vat, agitation of the dip is essential to keep it mixed. Regular agitation also helps to keep the vat cleaner by aeration of the water. A vat which is left standing and stagnant will get nasty quickly.

Chemical agitation is especially important in vats where CoRal is used because it is a wettable powder and will sink to the bottom of the vat.

In jump in vats, agitation can be accomplished by circulating pumps, compressed air, a hand operated plunge board or a combination of the above. In a hydraulic cage vat the chemicals can be agitated by lowering the cage into the vat a few times.

**Install Air Line**

A compressed air line installed in the bottom of the vat is an easy labor saving way to agitate a jump in vat. The line should be a one-inch pipe with 1/16-inch holes drilled at five-inch intervals on the under side of the pipe. The pipe should be mounted one to two inches off the bottom of the vat and the holes should be on a 45 degree angle.

An air compressor capable of delivering one-half cubic foot per minute at 40 psi for each foot of pipe along the bottom of the vat is required, according to the USDA.

Frequent agitation of the vat with the air compressor will aerate the water and help prevent it from becoming foul. It is recommended that a timer be attached to the compressor so that it will release air into the bottom of the vat for two to five minutes every 30 to 60 minutes.

It is not advisable to leave the compressor running continuously because it will over heat. It is also important to skim floating hair and other debris off the surface of the water after each dipping session.

A dipping vat can also be agitated by using a hand operated plunge board which is pushed up and down in the water like a butter churn. The only problem with this system is that few people are willing to expend the required physical effort to agitate the vat by hand.

A vat can also be mixed by jumping in a few head of cattle. These cattle will have to be returned and redipped a second time in the mixed dip. It is best to have a mechanical method for agitation because it is more reliable.

A premix tank should be used to mix the chemicals before they are added to the vat. This is especially important when a wettable powder is used. A premix tank is advisable for all dip vat chemicals because it avoids splashing concentrated chemicals around when you attempt to dump them directly into the vat. Chemicals in the premix tank can be agitated with an air hose with a T-shaped fitting on the end.

Dip chemicals are toxic to people and people handling the concentrated chemicals should wear rubber gloves. A respirator should be worn while handling powders to protect the operator from the dust.

Studies conducted by John Swee-ten, Texas A & M University at the Olton Feedyard in Olton, Texas indicated that the use of a Hydrasieve static screen can greatly prolong the life of the vat chemicals. The screen filters out dirt, hair and manure which collects in the vat.
The filter system reduces disposal requirements by 50 percent and pesticide usage by 30 percent. The system does not measurably affect the concentration of chemicals in the vat. Almost twice as many cattle can be dipped before the vat needs recharging.

The filter system is really quite simple. It consists of a 28-inch .02 inch Bauer Hydrasieve screen and a three-inch Gorman Rupp trash pump which is equipped with a flexible suction hose.

Water is sucked up through the hose at the rate of 120 gallons per minute and passed over the screen. The solids slide off the sloping screen and the water passes through the screen and returns to the vat by gravity. The Hydrasieve system should be run before and immediately after each dipping session.

The approximate cost of the screen, pump and hose is $5,000. In a large jump in vat, it will pay for itself after 32,000 cattle have been dipped, according to Sweeten. The filter system works very well.

If you are planning to build your own filter system you make sure that you buy SUCTION hose. The hose has to be rigid enough to prevent collapse during suction.

The trash pump can be directly coupled to a motor and a gate valve will be needed to throttle the flow of water down to 120 gallons per minute to avoid overflowing the screen. Diaphragm type pumps can not be used because they produce a pulsing stream of water.

This dipping vat system was designed for McElhaney Cattle Co. in Wellton, Az. A similar system has also been built at Red River Feedyard in Standfield, Az. Three people can dip 600 cattle per hour in this facility. It is equipped with all steel curved leadup chutes with solid sides to facilitate the flow of cattle. A built in filter system and air agitation system prolongs the life of the chemicals. The gates in the drip pens can be controlled by the operator at the dipping vat entrance.

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