

Use of Injectable Drugs on Farrowing Sows

By: Dr. Barbara Straw, DVM, Michigan State University Swine Veterinary Extension

Many decisions made by swine producers have ramifications for the end product; specifically, the use of antibiotics may produce drug residues or result in transmission of resistant strains of bacteria through the food chain. Concern for production of residue-free pork and less reliance on antibiotics has caused producers and veterinarians to reevaluate the benefits and risks of antibiotic treatments that are in common use. The annual removal rate of sows has been reported to be between 35 and 55%. When a high proportion of culled sows receive medications during the farrowing period, there is a considerable risk for introducing residues into the food chain. This study was undertaken in order to provide baseline information on the extent of injectable drug use in the farrowing house in the industry, and to allow individual producers to compare their own drug usage to that on other farms.

A survey was used to obtain information from 301 farms regarding injectable medications given to 231,016 sows during the farrowing period. Data were summarized and treatment regimens compared among farms of different sizes.

A multi-phase stratified sampling process was used to randomly select 418 swine producers in the top 16 swine-producing states who had at least 300 growing pigs. Of the 418 producers, 358 had a farrowing phase, and 301 of these 358 producers completed the survey regarding types and doses of drugs administered to sows in the farrowing house and reasons for using those drugs. Eight disease conditions were listed on the survey form (Table 1).

Farms were assigned to 4 categories by number of farrowings per year (F/y). There were 105 small farms (≤ 200 F/y), 106 medium farms (201-500 F/y), 62 large farms (501-2,000 F/y) and 28 very large farms ($\geq 2,001$ F/y).

On 97% of the farms, sows were housed in confinement or open buildings where producers had ready access to sows at farrowing for diagnosis of illness and administration of medications.

For each drug used to treat sick sows, the number of farms on

which the drug was used, number of farrowing sows that received an injection of each drug and the dose used were tabulated.

Routine administration of medication to healthy sows at the time of farrowing Of the 301 producers surveyed, 61 (20.2%) routinely administered injectable medication (other than de-wormers, prostaglandins and vaccines) to all sows at the time of farrowing as a preventative measure. Common products used for routine preventive medication were procaine penicillin G (28%), a mastitis-metritis-agalactia ("MMA") mixture (21%), procaine penicillin and oxytocin (18%), or oxytocin (8%).

Producers that used preventive medication at the time of far-

"It is probably safe to conclude that routine treatment of sows at farrowing is not beneficial..."

rowing also subsequently treated sick sows. Producers using preventive medication treated as many sick sows as producers who did not use preventive medication (32% vs 27% of farrowed sows). It is probably safe to conclude that

routine treatment of sows at farrowing is not beneficial in preventing subsequent illness.

Total number of sows given medication - In the 61 herds in which sows routinely received medication at the time of farrowing, there were 38,735 sows that farrowed and received a routine treatment; 12,589 of these farrowing sows were also treated for a specific disease or condition. There were 192,281 farrowing sows in the 240 herds in which sows did not routinely receive medications, and 51,724 of these sows received medication for treatment of specific diseases. Overall, 90,459 of the 231,016 farrowing sows (39%) received injectable medication.

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Table 1

Condition	Number of sows treated per year	Treatment Chemical, generic or brand name of product	Amount given cc (ml)	Person who suggested this treatment
Dystocia: farrowing difficulty; slow farrowing				
Uterine discharge: Copious, putrid uterine or vaginal discharge after farrowing with sick sow				
Poor appetite with or without fever				
Agalactia: Poor milk production; failure to milk				
Malignant Hyperthermia: "Puffer sow syndrome"				
Mastitis: udder infection; hot, red, swollen gland(s)				
Injuries: shoulder ulcer, torn claws, torn teats, etc				
Savaging: attacking piglets, "sow hysteria"				

Do you provide a routine treatment to every sow that farrows as a preventive measure at the time of farrowing?
 Yes No.....If yes, what treatment(s) do you routinely give to sows? :

Treatment of sick sows - Table 2 shows how frequently sows were treated for different disease conditions on the farms in the survey. Interpretation of the table is as follows: On farms ranked in the lowest one-third, producers were only treating 1.2% of sows for farrowing difficulty, while on the top 10% of the farms (90th percentile) 34.3% of sows were treated for farrowing difficulty. A producer who treated 10% of his sows for farrowing difficulty was ranked at the 70th percentile which means that he treated more sows than 70% of the other producers in the survey.

This table can be used as a guideline for producers to see how the frequency of treatment on their farm compares to the industry. Producers can estimate how many sows are treated for each condition or use information that they recorded on sow cards to determine how many sows they are treating. After they know how many sows they are treating for each condition, they can use the table to see how they compare to the industry. When any category of treatment is in the 70th percentile or higher it merits further investigation. On some farms there is an unusually high prevalence of disease while on other farms there is a mis-diagnosis of disease. As an example, when 12% of the sows are being treated for uterine discharge, on one farm it may be caused by excessive assistance at farrowing that introduces infection into the uterus, while on another farm it may be a failure to differentiate between normal expulsion of healthy placental tissue and discharge of infected material.

Farm size - Farm size didn't influence the overall percentage of sows that were treated, nor the percent in each disease category with the exceptions that on very large farms nearly twice as many sows were treated for farrowing difficulty and savaging as on small farms. Larger farms might be more likely to have someone in attendance at farrowing and so have a

greater opportunity to detect and treat these conditions. Farm size also was not associated with the type or dose of drug used. Veterinarians were listed as the primary source of information regarding drug use regardless of the size of the farm.

Drugs most commonly used to treat sick sows -The most common medications used to treat sick sows were oxytocin (250/301 farms), procaine penicillin G (192 farms); and B vitamins (68 farms). Administration of less than or greater than the approved dose of any given medication was common. Only 12% of sows treated with procaine penicillin G, 28% treated with oxytetracycline, and 48% treated with oxytocin received the approved dose. Also a considerable percentage of medications that sows received during the farrowing phase were not indicated for that condition. For example, the drug most commonly used to treat mastitis in sows was penicillin although in swine, mastitis is usually caused by gram-negative bacteria and penicillin is primarily effective against gram-positive bacteria.

Across farms, administration of individual drugs not approved for use in swine was a common practice. Just over 4% of sows (9,304/231,016) received injections of unapproved drugs such as dexamethasone, acepromazine, benzathine penicillin, flunixin meglumine, dipyrone, ampicillin, amoxicillin, sulfadimethoxine, gentamicin or a combination product containing dexamethasone, chlorpheniramine maleate, dihydrostreptomycin and procaine penicillin. Furthermore, drug compounding is not an approved practice and yet an MMA mixture was commonly used to treat specific conditions and in addition, 13 producers routinely used MMA mixtures as a preventive treatment.

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Application

This survey was completed prior to January 1999 when all of the major swine slaughter facilities began requiring that producers be certified in the Pork Quality Assurance (PQA) program sponsored by the National Pork Producers Council. Nearly 20% of the producers who completed this survey were not in compliance with the guidelines put forth in the PQA program.

To avoid drug residues, unnecessary or inappropriate treatment, and comply with PQA guidelines producers should:

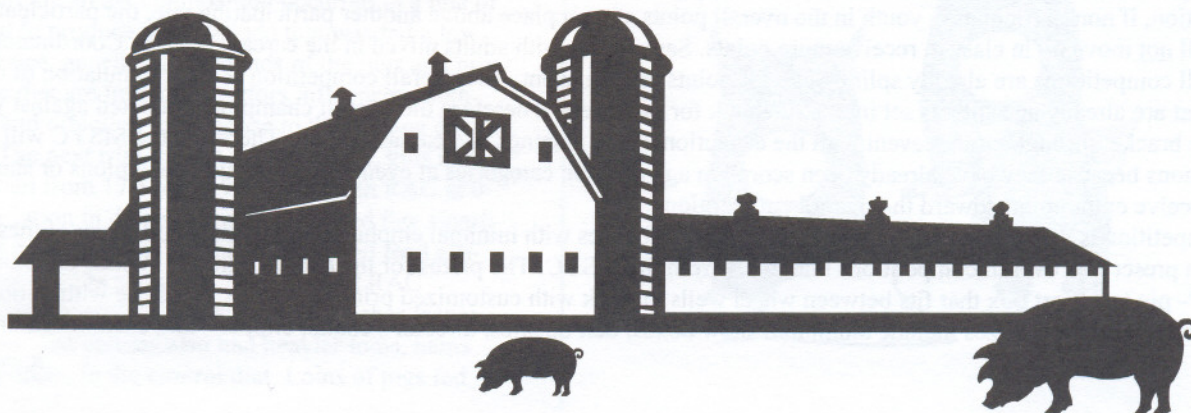
- Review their farm drug use protocols with their veterinarian to verify that the type and dose of drugs being used are appropriate for the conditions being treated. Overdosing adds an unnecessary expense and extends the withdrawal time. Under dosing is therapeutically ineffective and stimulates development of resistant bacteria. Using

the wrong drug for the condition being treated does all of the above.

- Consider discontinuing the routine use of treatment at the time of farrowing if being done. Routine treatment at farrowing is ineffective in preventing subsequent disease and the act of injection contributes one more stress at a critical stage. Stressful situations that elevate cortisol levels, as well as injections of dexamethasone have been shown to suppress milk production by 10 to 20%.
- Estimate how many sows are being treated on their farm and compare farm treatment rates to the industry. Follow-up when farm treatment rates exceed the 70th percentile to differentiate high prevalence of disease from over-diagnosis/treatment. 🐷

Table 2

Condition	Percentile Ranking of All Herds						
	0-30	40	50	60	70	80	90
Farrowing difficulty	1.2	3.6	5.4	7.1	10.1	14.7	34.3
Uterine discharge	0	0.4	2.3	3.5	5.3	12.2	38.0
Poor appetite	0	0.6	2.1	3.4	5.6	8.7	21.0
Lactation failure	0	0	0.7	1.9	3.4	6.6	17.1
Mastitis	0	0.6	1.4	2.5	3.9	6.8	17.4
Injuries	0	0	0	1.0	2.4	3.4	8.7
Savaging	0	0	0	0	0	0	2.3
Puffer sow	0	0	0	0	0	0	0.7
All conditions	5.0	12.6	17.3	23.7	30.9	45.0	79.9



Michigan Swine Youth Challenge

The Michigan Swine Youth Challenge (MSYC) is for swine project members, ages 9-21, of Michigan have an opportunity compete at several summer shows and accumulate points for an overall "Top 20" at the completion of the show season. The funding and administration is by a MDA Competitive Livestock Grant, Michigan Purebred Swine Breeders, and dues to the Michigan Swine Youth Association. The sign up will be a \$10 registration fee payable before 10AM on June 17, 2000 at the Spartan Classic earning you membership to the Michigan Swine Youth Association. The challenge will recognize youth that participate in educational and showing events at the following shows.

Spartan Classic June 17, 2000 MSU Pavilion

⇒All four of these contests will count for overall points

1. Pig-a-thon- Computerized swine knowledge quiz
2. Poster- Display that is educational or promotional (same committee judging as G&W)
3. Showmanship- how you place in class
4. Pig Placing- The highest placing individual shown (prospect or market) Total=200pts

Local County Fair June, July, August, September County Fairgrounds

⇒Both will count for overall points, this includes community fairs. Pick your highest showing at one fair to submit. No combinations of fairs.i.e. showmanship at one and placings at another.

1. Showmanship- your placing in class even though some youth are not in state points system
2. Pig Placing- the highest placing market individual or pair
- These are validated by signature from a leader/superintendent/fair board member on a card provided by the Michigan Swine Youth Challenge Coordinator. Total=100pts

Michigan State Fair August 22-24 State Fairgrounds, Detroit, MI

⇒ This show will recognize the top scores from four of the six contest listed. i.e. participate in six and count the highest four. Or choose four of choice.

1. Livestock Judging- evaluation of breeding and market swine with questions. (Swine portion is the only portion that counts)
2. Swine Knowledge Quiz- written test that covers same areas as Skillathon at G&W
3. Swine Evaluation- evaluation of market swine for carcass characteristics i.e. Back fat, Loin Eye Area, Percent Muscle. (Separate from livestock judging)
4. Carcass Contest- you're highest placing carcass pig in the barrow or gilt division of the open show carcass contest (the adult hogs or non points participants will not be removed for tabulation)
5. Showmanship- how you placed in showmanship class
6. Pig Placing- the highest placing market individual or pair shown Total=200pts

GRAND TOTAL= 500 POINTS

Youth ages 20 and 21, and some 19, may not be able to participate at their county fair depending on fair rules. Therefore they must score in all six contests at the Michigan State Fair to achieve the 500 points available. The points are based 50 points per participation in each contest. Pig placing and carcass class winners will get 50 points and every placing there after take three points off the placing above. Carcass class will recognize the top fifty in each sex division. Judging will be figured by using percentiles ($[\text{points scored} \div \text{points available} \times 100] \div 2$) to establish a 50 point score due to more points available than 50. The poster will be raw score. In tabulation, if non-participating youth in the overall points system place above another participating one, the participating points youth will not move up in class to receive more points. Same holds with adults mixed in the carcass contest. Coordinator will do tabulation. All competitions are already split by age for points at each event. The overall competition is an accumulation of contests at events that are already age split as set by the rulebook for that event. Therefore the overall champion competed against youth in the same age bracket throughout that event with the exception of pig placings and carcass shows. Therefore the MSYC will not have any age divisions because they have already been scored in age division categories at events. Age division champions or show champions do not receive extra points toward the overall competition.

This competition is designed to recognize youth and their abilities with minimal emphasis on pig placings. Many of these shows have their own prescribed overall competitions that differ from the MSYC. The prizes for the overall winners include an Alum-Line, Inc. "Popper"- pig transport box that fits between wheel wells in truck with customized printing for one year's use with option to buy at reduced rate. The other prizes include aluminum show boxes, belt buckles, director's chairs, clippers, and customized bags and hats.

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The winners will be announced at an event after the final county fair. The MSYC Coordinator is Donna Hines (517) 639-3336, 1111 E Chicago, Quincy, MI 49082. Or by E-mail: hinesdb@cbpu.com. She is accepting dues now until June 17. Sign up early. All county extension offices will receive information or call for more information by talking to your local AOE Swine Agent. 🐷

Ractopamine Alternative

By: Brian Hines, South Central Swine Agent
Ronald O. Bates, State Swine Specialist, MSU

The beta adrenergic agonist ractopamine has been demonstrated to increase nitrogen retention, improve growth performance, and increase carcass leanness when fed in the finishing phase. Ractopamine acts to partition energy from fat deposition to lean growth, which allows higher lean gains to be achieved at low to moderate feed intakes. The research on this feed additive, produced by Elanco, has been done over the past ten years and finally just received FDA approval for use in the swine production industry. The implications can be great when it relates to lean premiums and feed savings. But the real issue will be if the added gains to income will still be realized after utilizing ractopamine, cost efficiency. The continued emphasis on lean product drives ractopamine as a leader for a feed additive on healthy finishing hogs.

In one trial pigs were fed 18% and a 12% finishing diet with 20 and 30 PPM inclusion rates of ractopamine (RAC). The treatment groups resulted in an overall reduction of carcass fat by 8%, and an increase in carcass protein 5%, and a 21% improvement in the efficiency of protein utilization: the greatest changes occurred in the pigs being fed 12% diet. Both carcass lipid and protein seemed to be closely related to energy intake¹. Another trial feeding 24% and 12% crude protein rations, with RAC at 20ppm, found the greatest response to the treatment observed in the 12% ration group which had 31% less carcass lipid and 17% more carcass protein. Considering the change that took place between 130-200lbs., this translated into 57% less lipid and 59% more protein deposited in the carcass when compared to the control group. This group was also 73% more efficient in converting dietary protein to carcass protein but 39% less efficient in energy utilization. The implication of the trial was the greatest improvement in carcass composition occurred in a line of pigs that tended to produce more fat and that was fed a low protein diet. Hence, genetic backgrounds of the pigs and protein level of the diet are important factors influencing both the magnitude and direction of response to the feeding of ractopamine². The next trial looked at barrows vs. gilts and rations that varied from 17.5% to 19.6% CP, with RAC at 0-20ppm. The variation in dietary protein produced few significant effects but pigs fed RAC exhibited improved feed efficiency and fewer days to slaughter. The pigs fed RAC had .07 inches less fat with the gilts being .19 inches leaner than the barrows. The carcass also had heavier loins, hams and bellies than those in the control diet. Loins of pigs fed

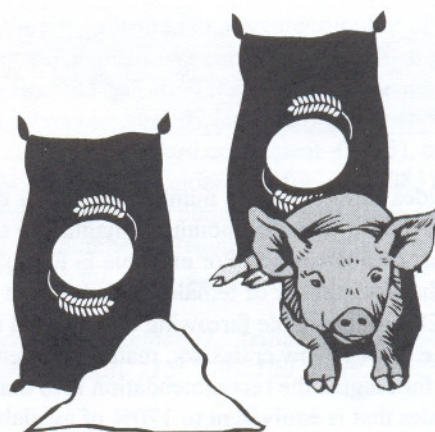
RAC had lower cooking loss and a slight increase in the Warner-Bratzler shear value, which deals with meat toughness. The implication is that addition of 20ppm RAC to the diet of typical commercial swine has the potential to improve yields without significantly effecting meat quality. This improvement is similar of barrows and gilts³.

As the industry is driven for maximizing efficiency this may be a product to explore in your own operation. With good records on the finishing phase a producer can determine the cost effectiveness and make the determination if this product will work for that operation. 🐷

¹Influence of level of dietary protein or energy on effects of ractopamine in finishing swine. USDA Beltsville MD, A.Mitchell, M. Solomon, N.Steele.

²Response of low and high protein on select lines of pigs to the feeding of the Beta-adrenergic agonist Ractopamine (phenethanolamine). USDA Beltsville MD, A.Mitchell, M. Solomon, N.Steele.

³Effect of Ractopamine and sex on growth, carcass characteristics, processing yield, and meat quality characteristics of crossbred swine, Purdue University, B.Uttaro, R.Ball, P.Dick, W.Rae, G. Vessie, L.Jeremiah.



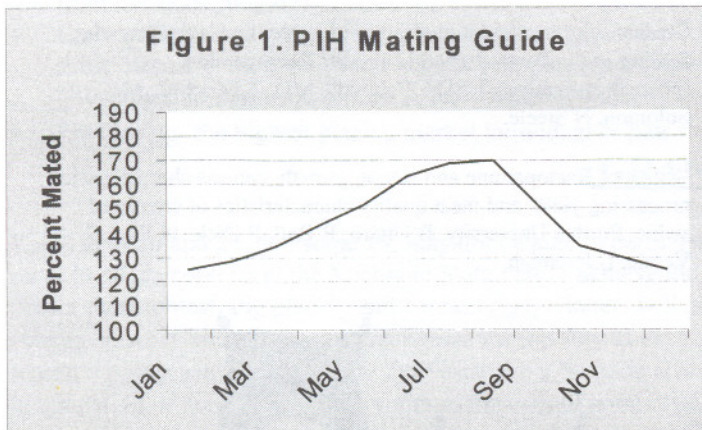
Get Ready for Summer, NOW!

By: Ronald O. Bates, State Swine Specialist, MSU

Ground Hog Day has barely past and the furry prognosticator has warned of six more weeks of winter. Yet you may wonder, what is the hurry regarding summer? As you may remember summer time brings much warmer weather, in which day and night time temperatures can be above the comfort zone of the sow and boar. During summer, sows will typically have lower conception rates and a higher percent of mated sows will return to estrus. Gilts will often be older at puberty and can have a lower likelihood of reaching puberty. Compared to farm targets, this can cause a smaller number of females, which conceive in the summer, to farrow in the late fall and early winter.

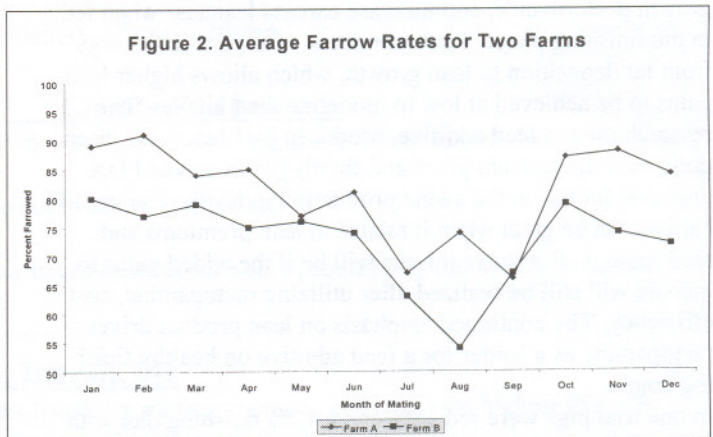
This does put farm profits in some quandary for two reasons. First, the number of pigs sold during the summer, when market price is usually the highest, is usually lower, due to fewer sows farrowed in the previous late fall and early winter. Second, the number of sows farrowed in the spring can be dramatically higher, due to the larger number of sows that recycled or delayed return to estrus in the previous late summer and early fall. This can cause a higher number of pigs marketed during the subsequent fall, when market price is usually lower.

The challenge is to “smooth out” the number of sows that farrow from month to month and quarter to quarter. The Pork Industry Handbook^a has a long-standing recommendation to vary the number of sows mated throughout the year (Figure 1)



This chart provides the increase in number of females that should be mated during different months to maintain a constant numbers of sows farrowed. For example in February, the chart suggests that the number of females mated should be equivalent to 128% of available farrowing crates to fill all farrowing crates (e.g. 24 farrow crates/wk, mate 30-31 females/wk). However for August the recommendation is to mate the number of females that is equivalent to 170% of available farrowing crates to fill all farrowing crates (e.g. 24 farrow crates/wk, mate 40-41 females).

This “Mating Guide” is a general rule and pork producers should modify it to match their farm conditions since farrow rate will differ between farms (Fig. 2). The Mating Guide is straight forward to calculate and follows the form; Monthly Mating Guide = $1 + (1 - \text{monthly farrow rate})$. For example if farrow rate for a month is .80 or 80% then the Mating Guide = $1 + (1 - .8)$ or 1.2 or 120%. Thus for a system that farrows 24 crates per week the number of females mated per week would be 28-29 ($1.2 \times 24 = 28.8$).



The Monthly Mating Guide for Farms A and B are shown in Figure 3. As can be seen the patterns for the two farms are similar but they do differ in magnitude. If the mating guide from Farm A was used for Farm B there may not be enough females mated to maintain full farrowing capacity. It is important that each farm develops its own monthly mating guide.

Developing a farm mating guide is not difficult but it does take some forethought. Farm records should be complete so historical farrow rates can be calculated on a monthly basis. It is important to note that monthly farrow rates are calculated for sows mated within a specified month, not farrowed within a specified month. For instance, to calculate the farrow rate for March, females that are mated in March are included in the calculations, not those that farrow in March.

Data should be compiled over several years to help stabilize these calculations. This helps reduce any impact an unusual circumstance could have on the outcome. However, use what data is available. If there is only one year’s worth of mating and farrowing data, use it.

The challenge to implement this guide is the flexibility to alter gilt numbers throughout the year. As sows are weaned during warmer months, their return to estrus is poorer thus a greater number of gilts must be mated to maintain the same number of females to farrow. However, during times of increased ambi-

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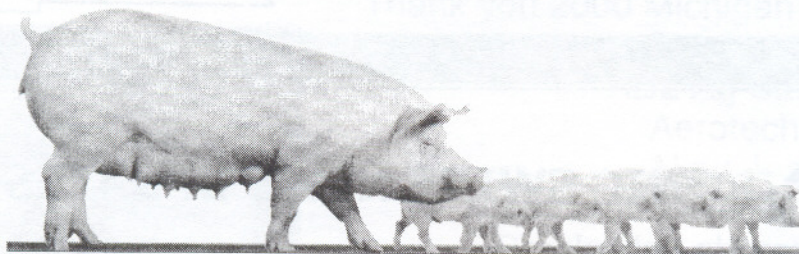
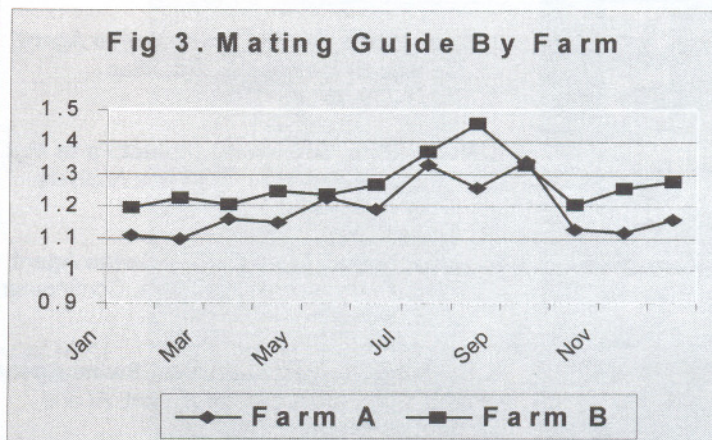
ent temperatures, gilts will achieve puberty at a lower rate and reach puberty at an older age. Therefore the increase in gilt numbers needed must reflect that fewer weaned sows will be mated and fewer gilts will achieve puberty at a given age. Research has indicated that approximately 85-90% of gilts will normally exhibit pubertal estrus. However, during summer months this can drop to 64%. This can cause gilt inventories to more than double if producers want to maintain similar numbers of sows farrowed, month-to-month. Farm history will be very important to determine the necessary gilt inventory. **Now is the time** (and it may be past time) **to determine how best to change gilt inventories for this summer.**

To illustrate how the target for number of females mated can change the monthly targets for Farm A and B were calculated (Table 1). There are a couple of interesting things to note. The first is that the change in females mated from the low to the high is 22% for Farm A and 24% for Farm B. The second is that for Farm B the number of matings peak in August, not September as in Farm A.

Variation in numbers of pigs marketed can be decreased by varying the number of sows mated during differing months of the year. However, farrowing rates by month of mating are needed along with some understanding of onset of puberty

during summer months. This information can be used to change the breeding targets and gilt inventory throughout the year to reflect seasonal needs and differences. This process can be further refined with information regarding sow culling and recycle rates at different times through the year. However, producers can make big strides in reducing pig flow variation by knowing change in farrow rates from month to month and fluctuating gilt inventories to better meet farm needs. 🐷

Fig 3. Mating Guide By Farm



One of the Questions of Life.....

Factors Affecting the Number of Teats in Pigs

The factors that affect the number of teats in pigs are of interest for both biological and practical reasons. Previous work indicates that there is a genetic component, principally from the dam. The proportion of males in a litter appears to be related to the anogenital distance of the gilts in the litter, possibly as a result of the intrauterine position effect. The present study investigated whether Litter size, litter sex ratio, anogenital distance, crown-rump length, distance from base of skull to base of tail, and the number of teats on the dam and boar affected the number of teats on gilts. Stepwise multiple regression on litter mean values (adjusted $r^2 = 0.178$) indicated that two factors were significant: the number of teats on the dam (standard coefficient 0.311) and the proportion of males in the litter (standard coefficient -0.282). A greater number of teats on the dam and a lower proportion of

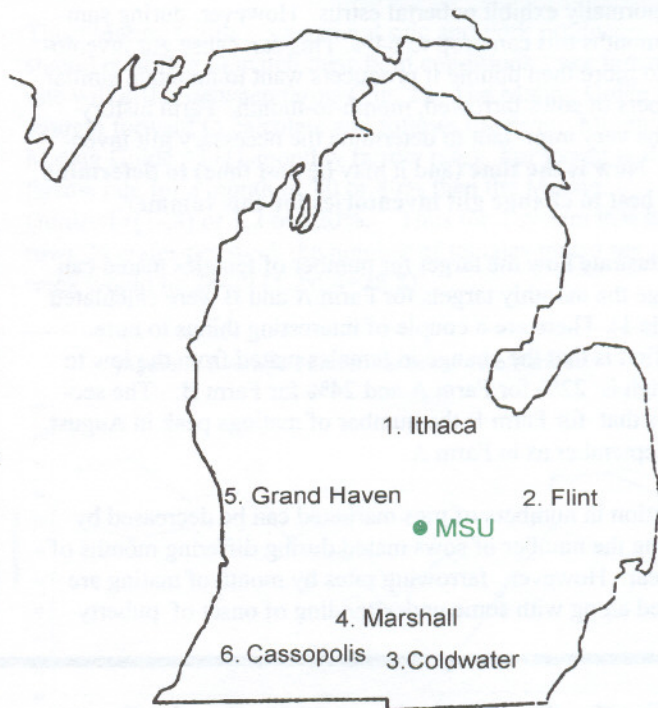
males in the litter resulted in a greater number of teats on the gilt. When the analysis was run using individual gilts as the independent units (adjusted $r^2 = 0.073$), the number of teats on the dam (standard coefficient 0.207), the proportion of males in the litter (standard coefficient -0.135), and the weaning weight of the gilt (standard coefficient 0.083) were all significant predictors of the number of teats. This evidence suggests that teat number in female pigs is related to the proportion of males in the litter. 🐷

Drickamer LC, Rosenthal TL, Arthur RD. Journal of Reproduction and Fertility 115(1):97-100, 1999.

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ELECTRONIC SWINE NEWS UPDATES

If you have a computer and have an e-mail address, you might be interested in receiving current news and information about the swine industry as it happens. The MSU Swine Extension team has been sending out electronic news updates to other producers and extension educators for about six months. Time is precious for every one of us, and time is what many of us needs to keep abreast of changes and happenings in the industry. The World Wide Web has allowed information to get out almost instantly, but finding it may be somewhat cumbersome. What the news updates try to do is summarize this information for you, search those various sites and compile information that may be useful. The news is sent out on an as needed basis and comes from a variety of resources. The electronic update is comprised of short articles in digest form to alert you to news in the industry, abstracts of research reports, and major market news and analysis. While not meant to replace your DTN, news updates do

provide some of the other information that may be helpful to your operation. Best of all its FREE. Simply send an e-mail message to Tim Johnson at <johnsoti@msue.msu.edu> and include a short note that you would like to be added to our mailing list and you too can begin receiving regular updates. If you don't like the results, simply let me know and I can remove your name from the list. 🐷

