

# MGA... ARE THERE REAL ADVANTAGES FOR USE IN BREEDING EWES OUT OF SEASON?



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## Principal action

Melangesterol Acetate, or MGA, is a synthetic analogue of progesterone which is active when administered orally. MGA is approved in Canada and is used commercially to suppress heats of heifers in feedlots. In the ewe, the action of MGA is the same as that of other progesterones of the same type (eg. MAP contained in the vaginal sponge). That is, that its administration inhibits the onset of heat in ewes. When the consumption of MGA stops, the secretion of hormones implicated in the arrival of heat and ovulation will resume. The first tests, of MGA's use as an agent of synchronization of estrous in ewes, go back to the year 1960.

## Use

As with other synchronization techniques that use synthetic progesterone, MGA is primarily used to invoke estrous in ewes out of season. However, it could also be used in season to synchronize heats and as a result the lambings in order to better plan the production of lambs.

## How to use

### The Product

Presently, melangesterol acetate is marketed by the company, Upjohn Animal Health, under the name « MGA 100 Premix™ ». In this premix, the active ingredient MGA, is diluted in soybean meal. The premix contains 220 mg of melangesterol acetate /kg of premix. It is available under a veterinarian prescription in containers of 25 kg. « MGA 100 Premix™ » is a uniform product that is preserved for at least 36 months.

### Quantity to serve

To obtain the desired effect, several experiments showed that the quantity that should be served is 0.25 mg of MGA/animal/day. In order to serve this quantity, it should be given at the rate of 1.1 g/animal/day of commercial premix. This quantity may be powdered on the supplement served during the reconditioning period. However, since it is a very small quantity, it is very difficult to feed the appropriate amount to each ewe. The simplest way the treat the ewes, is to incorporate the product directly into the pelleted feed that is intended for

reconditioning or flushing the ewes. Table 2 indicates the quantity of « MGA 100 Premix™ » that should be incorporated in

the pelleted feed according to the quantity of pellets being fed during reconditioning.

**Table 1. Dilution of « MGA 100 Pre-mix™ » for incorporation into pelleted feed**

Quantity of pellets fed (g/animal/day)	Melangesterol acetate (mg/animal/day)	kg « MGA 100 Pre-mix » per ton of pelleted feed
250	0.25	4.55
500	0.25	2.27
750	0.25	1.52

It is the veterinarian that will provide the necessary formula and prescription for the preparation of the pelleted feed. This pellet will have to be well identified by the feedmill to avoid the feeding of this product to animals which one doesn't wish to synchronize. On the farm, in the best storage conditions possible, the pelleted feed with added MGA can be conserved for approximately 4 months.

#### *Duration of treatment*

The majority of research studies show, that treatments of 8 to 12 days with MGA is sufficient to induce estrous out of season. The synthesis of available information suggests that treatment should last at least 12 days out of season. However, in season, when there are active corpus luteum on the ovaries, it may be that withdrawing MGA after only 10-12 days of treatment, the corpus luteum function, again producing progesterone. This prevents the arrival of heat in ewes when MGA is stopped. If the MGA treatment is not long enough, one finds that in a group of ewes the heats are not well grouped. Moreover, it is for this same reason that the duration of

treatment with vaginal sponges is 14 days. Thus, in theory, failing to have research on the subject, one should therefore choose to treat the ewes on MGA in season for 14 days. Tests are underway in Quebec to try and determine the optimal duration of treatment in season.

#### *Regulation of feeding*

It is preferable to serve pelleted feeding containing MGA in two meals per day preferably (10-12 h) between the two meals in order to ensure constant absorption of the product. Another important point is that it is necessary for all of the ewes to have access to the feeding manger at the same time, to ensure that they consume their quota of MGA. To avoid useless food stress on the ewes, use the same type of commercial pelleted feed for the entire duration of the reconditioning or flushing period.

#### *Injection of the PMSG*

One important characteristic of the MGA research to date is that very few of the studies were done with a combination of MGA and PMSG. In the United States,

since PMSG is not approved, the researchers use P.G. 600™ instead, which is a product approved to induce the estrous cycle prepubertal pigs. P.G. 600™ contains 400 IU of PMSG and 200 IU of hCG per 5 ml dose. hCG is a hormone which acts like endogenous LH and provokes ovulation of the follicles. Since the combined effects of PMSG and hCG contained in P.G. 600™ are different than PMSG alone, the results of the synchronization of heats is also different.

In general, injection of a hormone like P.G. 600™ or PMSG with the last feeding of MGA does not have any effect on the fertility out of season. One study however shows a positive effect on the fertility when P.G. 600™ is administered 4 hours after the last feeding of MGA. In a recent experiment out of season, Dr. Buckrell of the University of Guelph (Buckrell and McCutcheon, 1998) showed that injection of PMSG 5 hours after the last feeding increased the fertility compared to ewes that received PMSG with the last feeding of MGA (88% vs 56%). Thus, the results of some of the available research suggests that there must be an interval of time between the last feeding of MGA and the injection of PMSG, but the exact moment still remains to be determined.

#### *Putting in the ram*

The average interval of time between the end of the treatment and the start of estrous is approximately 4 or 5 days, with more than 80% of ewes coming into heat between days 2 and 5 after the treatment ends. The rams are introduced to the ewes 48 hours after the final treatment of MGA with a ratio of 1 ram for every 10 ewes. In commercial breedings, one can rotate the rams on a regular basis from

one pen to another to stimulate the libido of the rams. All of the rams used should be equipped with a harness-marker which makes it possible to evaluate the number of ewes which will come into heat following the treatment.

#### *Withdrawal period*

Animals treated with MGA should not be used for human consumption for a 2 days period after the final treatment. On the other hand, the withdrawal period for PMSG is 7 days.

#### *Effectiveness*

The induction rate of estrous out of season varies from 50% to 100% in the reported studies. The pregnancy rate among treated ewes has been established at about 60% with a range of 30% to 85%. The experiments show that 55% to 70% of the ewes will lamb in the first 10 days of the lambing and that all of the lambings will be finished within 30 days. Compared with using vaginal sponges, the precision of synchronization with MGA is much weaker (% of ewes coming into heat at the same time). This is understandable since the product is still present in the digestive tract at the end of the treatment. Moreover, there are surely individual variations in the rate of absorption and elimination of the product.

The majority of the research shows an effect of breed on the results of synchronization with MGA, as is often the case with other techniques to induce heat. For example, researchers (Keisler, 1992) obtained better results using Rambouillet ewes compared to Hampshire and crossbred ewes (58% vs 13% and 14%). Moreover, in an American study, the white faced crossbred ewes obtained

much better fertility rates compared to black faced crossbred ewes (81% vs 30%; MGA 7 days and PMSG 24 h after final treatment).

A technology transfer project was started in the spring 1999 (April-May) with 3 Quebec producers (Castonguay, 2000). The three producers each provided

approximately 80 ewes which were divided into 4 treatment groups: 1) no treatment to induce heat; 2) MGA for 12 days; 3) MGA for 12 days and 500 I.U. of PMSG 6 h after the last feeding of MGA; 4) MGA for 12 days and 500 I.U. of PMSG 12 h after the last feeding of MGA. Table 2 shows the preliminary results.

**Table 2. Reproductive performance results after inducing heat using MGA out of season (April-May)**

	No MGA	MGA	MGA + PMSG 6 h	MGA + PMSG 12 h
<b>Enterprise 1</b>				
Ewes in heat				
0 - 6 days after MGA treatment(%)	15.0	80.0	75.0	90.0
Int. stop MGA – fertilization projection (days)*	17.9	9.5	12.1	4.9
Total fertility (%)	83.3	100.0	89.5	94.1
Prolificacy	1.7	1.4	1.7	2.3
Ewes whose projected fertilization was Between 0 and 6 d after stop MGA (%)	0.0	47.4	26.3	76.5
<b>Enterprise 2</b>				
Ewes in heat				
0 - 6 days after MGA treatment(%)	5.0	80.0	95.0	100.0
Int. stop MGA – fertilization projection (days)*	20.3	3.6	2.0	2.1
Total fertility (%)	80.0	55.0	45.0	80.0
Prolificacy	1.6	1.9	1.7	2.1
Ewes whose projected fertilization was Between 0 and 6 d after stop MGA (%)	0.0	55.0	45.0	80.0
<b>Enterprise 3</b>				
Int. stop MGA – fertilization projection (days)*	14.5	7.3	6.0	11.1
Total fertility (%)	75.0	80.0	90.0	78.9
Prolificacy	1.7	1.7	1.8	1.5
Ewes whose projected fertilization was Between 0 and 6 d after stop MGA (%)	20.0	55.0	55.0	26.3

\* projected fertilization = theoretical estimated date of breeding (date lambing - 143 days) or heat observed closer to the theoretical date ( $\pm 5$  days from the theoretical date)

As shown by the facts in table 2, the use of MGA gives very variable results from one farm to another. It should be noticed first that the fertility of the ewes in natural breeding was very good at all three farms (83.3%, 80.0% and 75.0%), which minimized the potential positive impact of using the MGA out of season. The task remains difficult to identify a better protocol. If for enterprise #1, MGA made it possible to obtain excellent fertility with or without PMSG, for enterprise #2, it is clear that injection of PMSG 12 h after the last feeding of MGA gave the best fertility results. In regards to enterprise #3, it was the treatment of MGA with PMSG at 6 h that was most effective. However, the use of MGA in the three enterprises did not produce a very marked increase in fertility compared to no treatments.

Use of PMSG, in combination with MGA, also had variable effects on fertility and prolificacy. In enterprise #1, the fertility was not significantly affected by the use of PMSG, whereas with enterprise #2, injection of PMSG at 12 h definitely advantageous. There were no significant effects for enterprise #3. In two enterprises out of three, PMSG made it possible to increase the prolificacy.

The breeds and the ewes crosses used in the three enterprises were obviously varied: 1/2Dorset 1/2XX, Polypay, 1/2Polypay 1/2XX, 1/2Suffolk 1/2XX etc. As a result, the genotypes were too varied to allow any precise conclusions on the influence of breed of ewe on the results. At this time, it is difficult to formulate clear recommendations. Furthermore, these results confirm the observation of great variability that many Quebec producers who have tried the product have realized.

### **Cost**

Using for calculation purposes, a treatment of 0.25 mg/day of MGA for 12 days, or 1.1 g/day of commercial MGA 100 Premix™ which is sold for about \$475.00 for 25 kg, the cost of treatment is \$0.02/animal/day or \$0.24/animal for the duration of the total treatment. It is therefore, an extremely small cost.

### **Advantages and disadvantages**

This technique facilitates the synchronization of the lambings of large groups of ewes at a very low cost. Oral administration in the feed diminishes the handling (economy of time) and limits the stress on the animals. Moreover, the product is readily available. It is also possible to induce estrous in ewe lambs without the risk of potential wounds that might result from the use of a vaginal sponge. In season, the use of MGA could group the breedings and assist in the marketing of lamb in a regular and planned way. MGA could be an extremely effective tool to plan lambing and thus the production of lambs. Its use could offer great services to commercial organizations which would be in a better position to plan monthly production and marketing of lamb with their producers. The most significant disadvantage of the technique is the lack of regularity of the results, which is explainable because we have little information on that factors that affect the fertility of ewes on an MGA treatment program. Some of these factors worth mentioning are: homogeneity of the pelleted product (mixture milled), consumption of each ewe, duration of treatment, dose, time of PMSG injection, breed of ewes, etc.

The precision of synchronization or the rate of induction of heat following the

MGA treatment, seems weaker than the sponge method which may limit its use for insemination. However, these observations were as a result of studies that did not use PMSG but rather P.G. 600™. Further research will have to be undertaken to evaluate the use of MGA in artificial insemination.

### **Conclusion**

As it is a relatively new technique, most of the research is presently underway, particularly in the United States. In Canada, only small preliminary tests have been carried out. The general recommendation that can be with our current knowledge on the use of MGA is to feed the ewes with MGA for a period of 12 days out of season. PMSG should be injected approximately 12 hours after the last feeding of MGA. However, several questions are yet to be answered: 1) Is total fertility and prolificacy the same for ewes synchronized with the MGA or with the vaginal sponge?; 2) What is the minimal duration of MGA treatment in season?; 3) Does PMSG improve the fertility and/or prolificacy?; 4) What is the best time to inject the PMSG?; 5) Can MGA be used in insemination? In light of these questions, it is not surprising to note

that the use of MGA in combination with PMSG remains somewhat hazardous at present for producers.

At the moment of writing for this conference, a project subsidized by the Council for the development of agriculture for Quebec (CDAQ), supervised by Dr. François Castonguay, Agriculture and Agri-Food Canada is underway. The principal objective is to validate and develop the use of MGA as a technique for synchronization and induction of heat in the ewe. The results of this project should make it possible, to identify the factors which would explain the large variations of fertility in ewes synchronized with MGA.

The use of MGA is very interesting particularly from the cost point of view. In regard to the aspect of economics, the variable results and unforeseen results of fertility do not enable us to come to a precise assessment. It thus remains to demonstrate the real net benefit of the technique (revenues-expenses) compared primarily with the vaginal sponge technique. Research in progress should permit us to answer that question.

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