Ultrasound[1] Evaluation of the Follicle Development in Adult Female Broad-nosed Caiman (Caiman latirostris)

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[1] Ultrasound machine: Aloka No. 210 - DX2 (3.5 Mhz)

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Introduction

The reproductive cycle of crocodilians has been shown to be more complex and evolved than that of other reptiles. Their sexual maturity is size and age dependent, and normally, males grow up faster and get larger than females when adults. Generally, caimans, alligators and small crocodiles reach sexual maturity at a relatively smaller size than gharials and the larger crocodiles (Magnusson et al., 1989). According to these authors the reproductive cycle of crocodilians can be distributed all year long, like Caiman crocodilus crocodilus in the Amazon basin; in two distinct periods, like Nile crocodile in Uganda and Kenya where some females nest in August and others in December; or just in a restricted period of the year, like the other species.

The American alligator, which occupies the North limits of all crocodilians distribution, has a very delimited reproductive cycle. It starts in March with the beginning of gonadal development through hormonal action, when air and water temperature rises. Copulation occurs from late April to early May, with the egg-laying peak occurring in a two week period in June (hot years) or July (cold years), according to Joanen & McNease (1979). There is a rapid decline of the adult female ovaries and adult male testicles soon after egg-laying and during the incubation period (Lance, 1989).

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There is too little information on the broad-nosed caiman reproductive cycle. The first captive breeding results may elucidate some important aspects such as: nesting, incubation and hatching period, clutch size, etc. (Verdade et al., 1992). However, Brazilian captive colonies of the species have a low level of hatching success possibly due to management mistakes and/or high animals infertility rate (Verdade & Santiago, 1992). The following factors can affect the animals fertility: genetics, age (size), illnesses, and management practices such as: sex ratio, stocking density, breeding pen design, stress, and feed management (Cardeilhac, 1989).

Ultrasound evaluation of the follicle development may indicate the stage of a female in a certain moment of its reproductive cycle. It can also be used to evaluate the influence of exogenous hormones and the possible correct time to the artificial insemination as described by Larsen et al. (1988).

Materials & Methods

We evaluated the follicle development of 11 adult females from November 1990 to January 1991, and of three adult females from August 1991 to January 1992. We tested both ventral and lateral approaches with the ultrasound transducer.

PMSG was tested to induce ovulation in five females. The mean dose of 17.53 IU/kg ranging from 13.43 to 20.00 IU/kg was divided into six or seven applications from early November through the middle of December or January.

Results & Discussion

Both ventral and lateral ultrasound transducer approaches worked well in medium females (smaller than 90 - 95 cm in snout-vent lenght) but the lateral approach worked better in larger ones because of the osteoderms of the belly skin.

During the first year just two females laid eggs and another one ovulated but did not lay eggs. The others showed a short development followed by a regression of the follicles.

During the second period just one female ovulated and laid eggs. In August the females had follicles of 1.0 to 1.5 cm diameter, and ovulation occurred about 14 weeks later, when the follicles reached 3.0 to 3.8 cm diameter (Figures 1 and 2).

The tested PMSG doses did not produce follicular development with ovulation (Figure 3). Three possible reasons are:

A) The dose of PMSG was insufficient to induce ovulation;

B) PMSG was used later than the best period for its action: September - October may be better than November - December;

C) Periodic handling for administration of drugs could have produced a level of stress incompatible with normal ovarian response to exogenous hormones.

Female reproductive activity occurred over a much broader time period than observed in the alligator. Well-developed shelled eggs, ovulating eggs, and enlarging ovarian ova were observed during the same day in different females within the colony. This may make it more difficult for a regimen of hormonal stimulation to produce synchronised ovulation in captive colonies.

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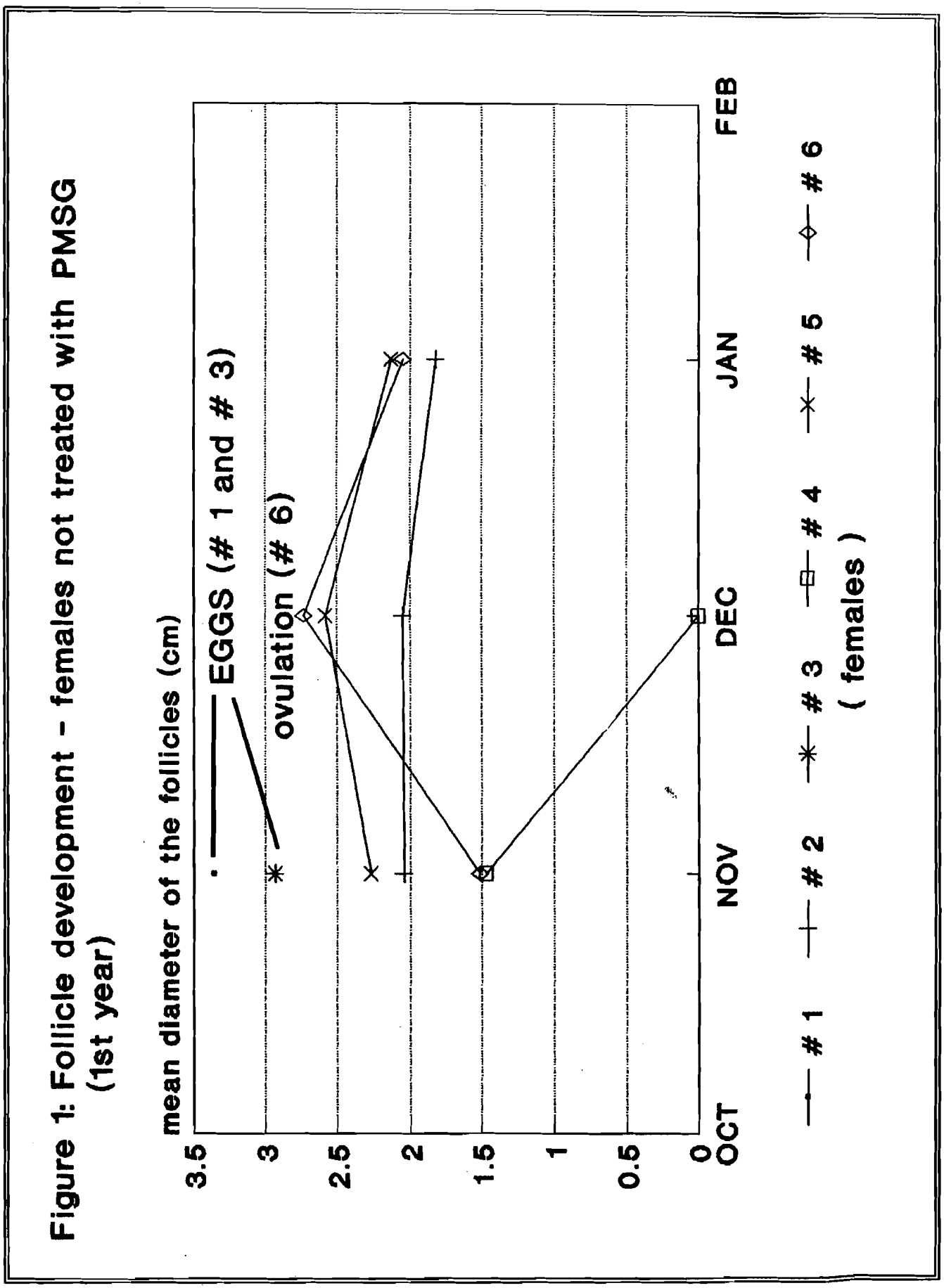
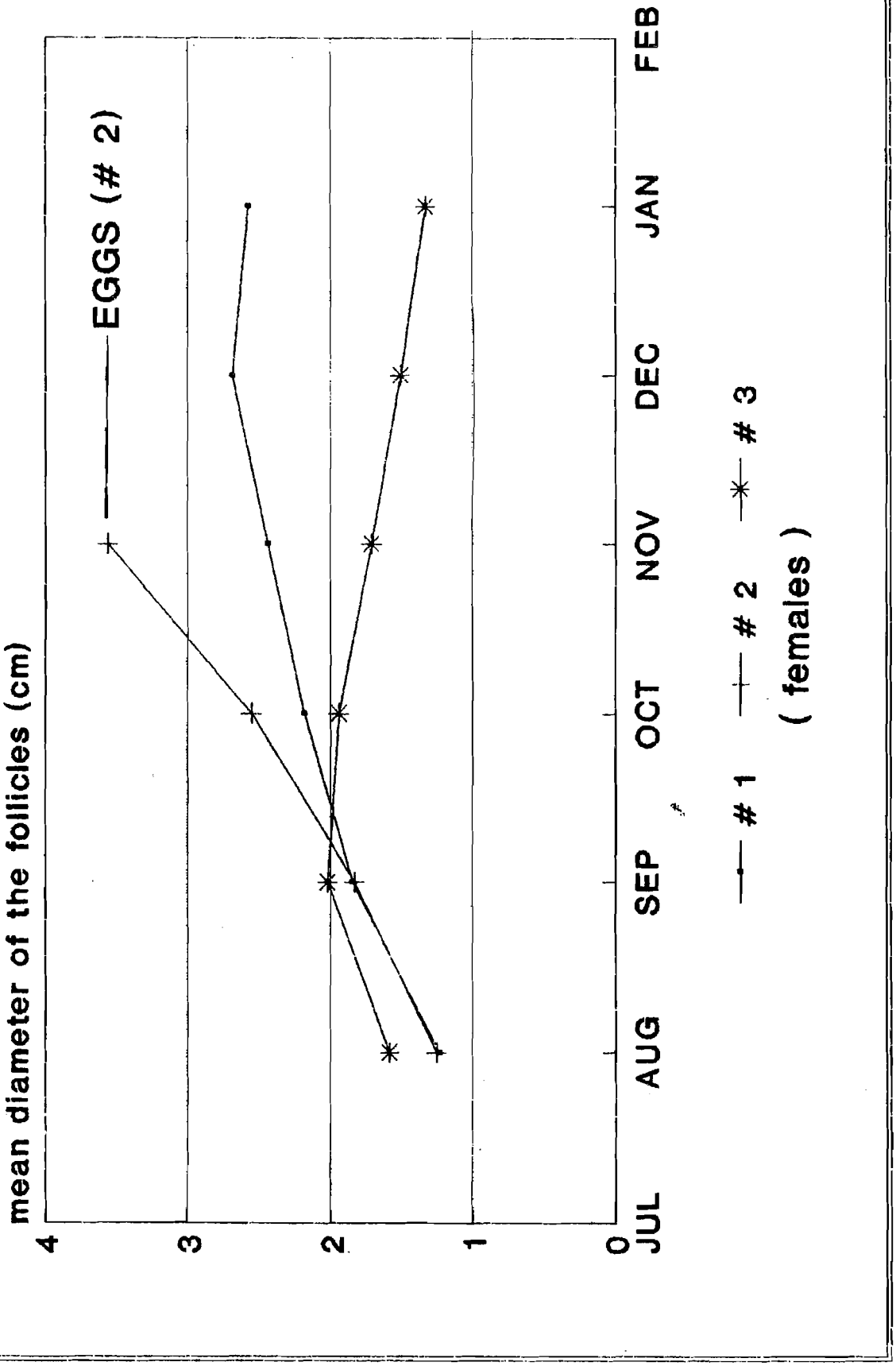


Figure 1: Follicle development - females not treated with PMSG
(1st year)
mean diameter of the follicles (cm)
EGGS (# 1 and # 3)
ovulation (# 6)
3.5
3
2.5
2
1.5
1
0.5
0
OCT
NOV
DEC
JAN
FEB
1
2
3
4
5
6
(females)

Figure 2: Follicle development - females not treated with PMSG (2nd year)



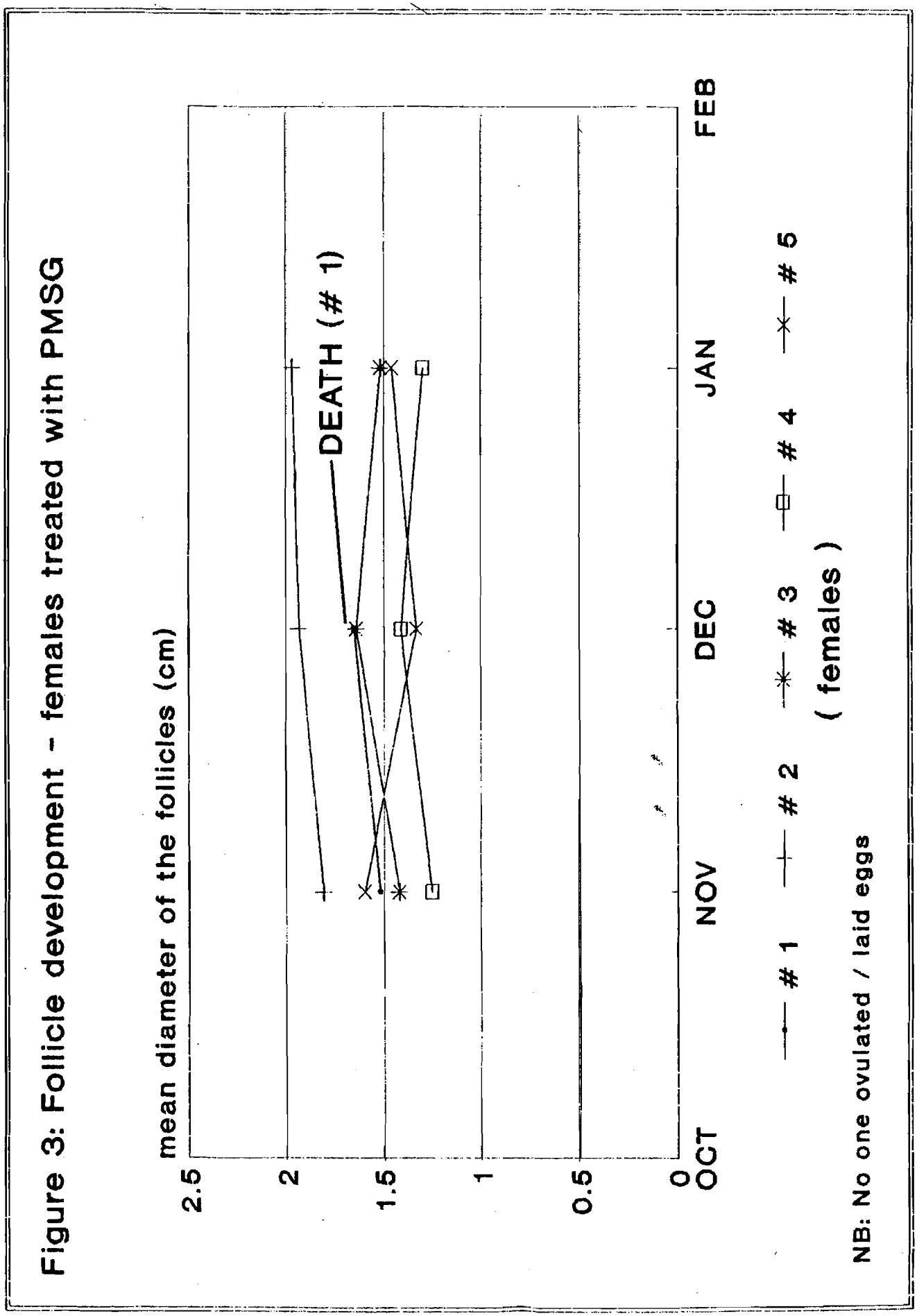


Figure 3: Follicle development - females treated with PMSG
mean diameter of the follicles (cm)
2.5
2
1.5
1
0.5
0
OCT
NOV
DEC
JAN
FEB
DEATH (# 1)
1
2
3
4
5
(females)
NB: No one ovulated / laid eggs