SUMMARY AND CONCLUSIONS

The present study "Gynaeco-clinical investigations on post-partum reproductive status and its management with recent therapeutical measures in cows" was conducted on 48 cows, 24 with normal and 24 with abnormal puerperium. These cows were maintained at Cattle Breeding farm, Telankhedi (Nagpur Veterinary college, Nagpur), Agriculture College Dairy Farm, Nagpur, Gorakshan Sanstha, Nagpur and by private livestock breeders in and around Nagpur city. The cows in normal puerperal category were divided in four groups, group I (control), group II (treated with PGF2α), group III (treated with PGF2α + GnRH) and group IV (treated with Exapar). The cows in abnormal puerperal category were also divided in four groups, group I (treated with routine antibiotics-Oxytetracycline), group II (treated with antibiotics + PGF2α), group III (treated with antibiotics + PGF2α + GnRH) and group IV (treated with Exapar + Uraksha).

The blood serum profiles for progesterone, glucose, total protein, calcium, phosphorus and cholesterol were studied on the day 0, 10, 20, 30, 40, 50 and 60 post-partum. During present investigations, following parameters were studied.

1. Incidence of reproductive disorders :

Incidence of various reproductive disorders was studied and it was revealed that the most common reproductive disorder was retention of placenta (8.20%) followed by anestrus (8.05%), pyometra/metritis (7.75%), repeat breeding (2.88%) dystocia (1.97%), abortion (1.97%), and prolapse of uterus (1.36%).

2. Cessation of lochial discharge :

Period required to disappearance of lochia was investigated. Average period required for Cessation of lochia in normal puerperal category was 21.16±0.79 days in group I, (control), 11.00±0.89 days in group II (PGF2α), 11.5±0.76 days in group III (PGF2α + GnRH) and 16.16±0.60 days in group IV (Exapar). Significant difference was observed between group II and IV. No significant difference was observed between group II and III. Group III significantly differed from group I and group IV.
In abnormal puerperium category average duration required for cessation of Lochia in group I (antibiotic) was 22.76±1.13 days, 16.66±0.42 days in group II (antibiotic + PGF₂α), 17.33±0.71 days was in group III (antibiotics + PGF₂α + GnRH) and 19.16±0.70 days in group IV (Exapar+ Uraksha). Group II and III differed significantly from group I and IV. Antibiotics + PGF₂α and Antibiotics + PGF₂α + GnRH treated regimens were found to be superior to antibiotic alone and Exapar treatment.

3. **Uterine tone**:

Post-partum uterine tone was examined in control and treated animals from both the normal and abnormal puerperal category. In normal puerperium category, uterine tone was restored earlier in group II and group III as compared to group I and IV. Similar observations were also made in abnormal puerperal category. This indicates that administration of PGF₂α and PGF₂α + GnRH helps in early restoration of uterine tone.

4. **Involution of uterus**:

Duration required for completion of uterine involution was studied during the present investigations and it was observed that in PGF₂α and PGF₂α + GnRH treated group involution was completed earlier than control and Exapar treated groups of normal puerperal category. The average duration required was 27.00±1.93 days, 22.83±1.16 days, 20.33±0.84 days and 25.16±1.01 days in group I, II, III and IV respectively.

In abnormal puerperal category also shorter duration was required in group II and III treated with Antibiotics + PGF₂α and Antibiotics + PGF₂α + GnRH respectively. The average duration required for completion of uterine involution was 41.5±0.99 days, 29.5±1.28 days, 27.16±0.87 days and 35.83±0.94 in group I, II, III and IV respectively.

5. **Post partum ovarian activity**:

Post-partum ovarian activity was monitored by per rectal examination throughout the experimental period in all the cows. Under normal puerperal category ovarian activity was initiated earliest in group III. The mean duration required for initiation of ovarian activity was 3.80±0.30, 3.16±0.30, 2.83±0.30 and 4.00±0.28 weeks respectively in group I, II, III and IV. In abnormal puerperal
category ovarian activity was initiated earlier in group II and group III as compared to group I and group IV. The mean duration required for initiation of ovarian activity was 5.75±0.39, 4.16±0.30, 4.16±0.30 and 5.40±0.46 weeks in group I, II, III and IV respectively.

6. Appearance of post-partum estrus:

   The average period required for appearance of first post-partum estrus was 79.60±3.85 days in group I, 66.83±2.91 days in group II, 56.50±3.51 days in group III and 72.50±0.97 days in group IV of normal puerperal category. Significant difference was recorded among all the groups except between group I, and group IV. In abnormal puerperal category average duration required for appearance of first post-partum estrus in group I was 98.00±2.18 days, 76.50±1.20 days in group II, 74.33±2.07 days in group III and 93.20±4.01 days in group IV. Group II and III differed significantly from group I and IV. However, non-significant difference was recorded between group I and IV and so also between group II and III.

7. Calving to conception interval:

   In normal puerperium category, average duration required for post-partum conception in group I was 111.50±5.50 days, in group II it was 82.50±4.12 days, in group III it was 71.33±7.51 days and in group IV it was 103.00±5.02 days. In abnormal puerperal category duration required for post-partum conception in group I was 140.53±14.11 days, in group II it was 107.83±10.20 days, in group III it was 97.40±9.84 days and in group IV the duration was 136.66±9.95 days.

8. Number of services required per conception and conception rate:

   The average number of services per conception was 3.00±0.36, 1.83±0.16, 1.66±0.33 and 3.00±0.22 and conception rate of 80.00, 100.00, 100.00 and 80.00 per cent was recorded in group I, II, III and IV respectively in normal puerperal category. In abnormal puerperal category, the average number of services per conception was recorded to be 2.75, 2.50, 1.73 and 2.60 and conception rate was recorded to be 75.00, 83.33, 83.33 and 60.00 per cent in group I, II, III and IV respectively.
9. **Serum progesterone (P₄) profile:**

Estimation of serum progesterone level is the precise method to judge the status of ovarian activity, thus progesterone estimation was undertaken in post-partum cows during the present studies. Lowest levels of progesterone were recorded on day of parturition in all the experimental animals. Subsequently, nominal rise of progesterone was recorded between day 10 to day 50 (except three cows in group III). Even with this rise the progesterone concentration was fluctuating below the basal level of 0.5ng/ml. However, on day 60 higher progesterone concentration with mean of 3.08±0.71 and 2.24±0.98ng/ml was recorded in PGF₂α + GnRH treated cows of normal and abnormal puerperal category respectively. These cows were subsequently detected in estrus and were bred. Cows from other groups with exception of one or two did not come in estrus by day 60 post-partum.

10. **Serum glucose profile:**

In normal puerperal category cows, the average serum glucose levels ranged between 40.14±1.78 to 53.80±2.19 mg/100 ml, considering all the four groups during the experimental period. The values recorded on day sixty were significantly higher than those recorded on day 0 i.e. day of parturition in all the four groups. Overall mean levels were lower in group II and III as compared to control i.e. group I. In abnormal puerperal category cows, the average serum glucose levels ranged between 40.51±1.26 to 54.71±2.09 mg/100 ml, throughout the experimental period. The overall mean values were recorded to be 48.26±1.90, 44.82±1.44, 47.70±1.75 and 50.56±2.12 mg/100 ml in group I, II, III and IV respectively. Difference among these values was found to be non-significant.

11. **Serum total protein (STP) profile:**

In normal puerperal category cows, the mean values for STP ranged between 7.57±0.34 to 8.26±0.57, 6.35±0.19 to 6.75±0.60, 6.33±0.17 to 7.04±0.43 and 6.63±1.46 to 7.12±0.38 g/100 ml in group I, II, III and IV respectively. The overall mean values were recorded to be 7.77±0.34, 6.50±0.22, 6.36±0.19 and 7.10±0.41 g/100 ml in group I, II, III and IV respectively. The overall mean levels of STP were significantly lower in group II and III as compared to group I and IV.
In abnormal puerperal category cows, the STP levels ranged between 6.94 ± 0.28 to 7.39 ± 0.20, 6.15 ± 0.09 to 6.42 ± 0.15, 6.15 ± 0.18 to 6.63 ± 0.15 and 6.69 ± 0.57 to 7.55 ± 0.57 g/100 ml in group I, II, III and IV respectively. The overall mean values in respective groups were recorded to be 7.25 ± 0.24, 6.29 ± 0.12, 6.44 ± 0.15 and 7.32 ± 0.35 g/100 ml. The mean values recorded in these animals did not vary significantly among the groups and between the days as well. No significant difference was recorded between overall mean values among the groups in abnormal puerperal category.

12. **Serum calcium profile**:

The mean values of calcium levels ranged between 8.07 ± 0.25 to 9.26 ± 0.32 mg/100 ml in normal puerperal category cows. The overall mean values were recorded to be 9.01 ± 0.34, 8.88 ± 0.29, 8.44 ± 0.25 and 8.94 ± 0.37 mg/100 ml respectively in group I, II, III and IV. Lower calcium levels were recorded on day of parturition which gradually increased up to day 60 post-partum. In abnormal puerperal category cows the mean calcium level ranged between 6.47 ± 0.16 mg/100 ml and 8.63 ± 0.26 mg/100 ml. The group-wise overall mean values were recorded to be 7.09 ± 0.16, 7.29 ± 0.29, 8.05 ± 0.16 and 8.30 ± 0.20 mg/100 ml in group I, II, III and IV respectively. Overall mean values of group III and IV differed significantly from those of group I and group II.

13. **Serum phosphorus profile**:

In normal puerperal groups, the mean phosphorus levels ranged between 4.45 ± 0.07 to 5.78 ± 0.24 mg/100 ml. The values recorded on day 0 post-partum were lowest in all the groups (except group III), which gradually increased up to day 60 post-partum. Increasing trend was observed in all the animals except group III in which the values remained fluctuating between days 0 to 60 post-partum. Group-wise overall mean values were recorded to be 4.85 ± 0.18, 5.20 ± 0.15, 5.13 ± 0.24 and 5.18 ± 0.19 mg/100 ml in group I, II, III and IV respectively. Statistically, overall mean values were found to be significantly lower in group I as compared to other three groups. In abnormal puerperal category cows the values ranged between 3.75 ± 0.12 and 5.76 ± 0.56 mg/100 ml. Lower phosphorus levels were recorded on day 0 post-partum, which gradually increased up to day 60 post-partum. The group wise overall mean values were recorded to be 3.86 ± 0.09, 4.24 ± 0.14, 5.05 ± 0.29 and 4.50 ± 0.15 mg/100 ml.
respectively in group I, II, III and IV. The overall mean values of group II, III and IV significantly differed from those of group I.

14. Serum cholesterol profile:

In normal puerperal animals, the serum cholesterol levels ranged between 146.53±4.86 to 154.24±4.91, 142.3±6.80 to 155.98±5.01, 132.29±7.29 to 166.76±5.37 and 142.52±10.23 to 151.95±10.29 mg/100 ml in group I, II, III and IV respectively. The overall mean levels were recorded to be 150.26±3.75, 149.52±2.19, 151.55±6.29 and 145.87±7.90 mg/100 ml in group I, II, III and IV respectively. Non-significant difference for serum cholesterol levels was observed between days and between groups also.

In abnormal puerperal animals, the serum cholesterol levels ranged between 116.66±9.91 to 128.28±2.20, 119.43±4.09 to 129.17±2.37, 121.32±3.18 to 128.10±4.13 and 119.57±5.87 to 130.34±3.38 mg/100 ml in group I, II, III and IV respectively. The overall mean levels in group I, II, III and IV were recorded to be 123.71±5.78, 125.63±5.78, 125.91±3.45 and 124.24±3.69 mg/100 ml, respectively. The difference for serum cholesterol levels between days and between the groups was found to be non-significant.

Conclusions:

On the basis of the results obtained during the present investigations, it may be concluded that:

1. Anestrus and retention of placenta are the most common prevailing reproductive disorders.

2. Administration of PGF₂α / PGF₂α +GnRH treatment during early post-partum period enhances post-partum fertility, which has been reflected in term of faster uterine involution, early post-partum estrus, shorter calving to conception interval, higher conception rate and lesser number of services per conception during the present investigations.

3. Threshold progesterone level is essential for clear manifestation of first post-partum estrus; which could be managed by administration of exogenous GnRH.
4. Administration of Exapar alone or Exapar + Uraksha could be useful in promoting the uterine involution in normal puerperal cases and combating the puerperal disorders such as retention of placenta, pyometra etc.

5. Blood profile of biochemical constituents was not affected by administration of PGF$_2$α, GnRH and Ayurvedic drug Exapar.