these areas may be redundant. However, the effectiveness for estrus synchronization of beef cattle and dairy heifers suggests use of PGF2α in dairy cows. Lactating dairy cows that had not been detected in estrus between 61 and 257 days postpartum, but had a corpus luteum detected by palpation of the ovaries *per rectum* (unobserved or silent estrus), were assigned randomly in replicates to control and Lutalyse® sterile solution experimental groups within each of 20 herds distributed among six investigators located in Colorado, North Carolina, Florida, Michigan and Kansas. Cows assigned to the control group were artificially inseminated (AI) at each estrus detected after assignment on study. Cows assigned to the Lutalyse (PGF2α) group were injected with 25 mg PGF2α (5 ml Lutalyse) intramuscularly. The PGF2α cows were AI at each estrus detected after injection and if a cow had not been detected in estrus by 75 to 80 hr post injection, she was AI at that time and at each estrus subsequent to that AI. The uterus of each cow was palpated *per rectum* at 35 to 70 days after AI to measure pregnancy status.

Data were analyzed statistically by means of least squares analyses of variance with the herd x experimental group interaction used as the error term for testing significance of experimental group differences. Average intervals between calving and assignment on study were 119.6 and 128.5 days for control and PGF2α cows. Average body weights were 1,302 and 1,334 lbs for cows of control and PGF2α groups. Pregnancy rates (no. pregnant x 100 ÷ no. per group) between cows of the control and PGF2α groups where 0 and 24.2% ($P<.0003$) by 80 hr., 2.6 and 28.4% ($P<.0001$) by 5 days, 27.1 and 32.7% ($P<.45$) by 24 days, 46.5 and 52.9% ($P<.46$) by 60 days, and 55.0 and 57.6% ($P<.71$) for duration of breeding after assignment on study. Thus, PGF2α cows were pregnant in a 5 day interval at a rate comparable to controls in 24 days (28.4% vs 27.1% for control). The pregnancy rate of controls in 24 days of 27.1% indicated assignment to study increased their pregnancy rate since they had not been detected in estrus during the previous average interval of 120 days. Pregnancy rate during the first 5 days after PGF2a was a result in part of inseminating 84% of cows assigned to the PGF2α group at about 80 hr. Because of timed AI, services per conception were greater for cows of the PGF2α versus control groups (1.8 vs 1.4, $P<.03$). First and second insemination conception rate (no. pregnant x 100 ÷ no. AI) averages varied between 27% and 40%, but did not differ between cows of the control and PGF2α groups. The "low" conception rates (National average approximates 49%) of cows on this study reinforces the conclusion that these cows represent a sample of problem breeders.

These data support a conclusion that Lutalyse sterile solution was effective for the treatment of unobserved (silent) estrus as measured by pregnancy rates within five (5) days after treatment. The data also reinforce clinical observations that increased awareness by herd managers of unobserved estrus cows can lead to detection of estrus and AI leading to pregnancy. This latter observation leads to the suggestion that PGF2α would be effective for treatment of cows with a CL at about 60 days post-partum rather than waiting for a longer postpartum interval in hopes that estrus would be detected.

The Divided Milking Machine—A New Design

Robert B. Corbett, *D.V.M.*
Dairy Health Consultation Service
Rt. 3, Box 454
Blackfoot, Idaho 83221

The idea of the divided milking machine or 4-way system as it is now called, was first conceived quite some time ago, but the first prototypes have only been milking in field trial dairies for approximately the last two years.

The primary purpose of the 4-way milk system is to prevent cross-infection from one quarter to another on the same cow. This cross-infection may be induced in a conventional claw system through liner slippage, fall off of a teat cup, manual removal of a teat cup from a quarter that is milked out, slow attachment of milkers at the beginning of the milking process, removal of the milking cluster without shutting off the vacuum, etc. Since each individual quarter has a separate milk tube all the way to the pipeline, automatic take-off sensor or weigh jar, there is no possible way that bacteria shed from one quarter will be transmitted to a clean quarter on the same cow by the milk system itself.

When liner slippage occurs there is little vacuum fluctuation at the teat ends of the other 3 teats. If one teat cup is removed and allowed to suck air, a Detco recording only shows a drop in vacuum of ½ to 1½ inches Hg depending on pipeline size, reserve air capacity and sensitivity of the vacuum controller. A conventional claw milking system often shows a drop in vacuum of 4 to 7 inches Hg depending upon the same parameters previously mentioned. This increased vacuum stability at the teat end when air is allowed into the system at one teat cup has other benefits besides decreasing cross-infection and teat end impacts. When placing a claw milker on the cow there is often a large influx

of air when attaching the last teat cup. This influx of air will sometimes break the vacuum seal at the other teats, thus causing some or all of the teat cups to fall off. When cows kick at the milk cluster and remove one teat cup with their foot, the other 3 usually detach also. The 4-way system eliminates these two problems and allows for easier removal of one teat cup from a quarter that milks out faster without greatly affecting the vacuum stability at the teat ends of the other three teats.

The design and flexibility of the tubing of the 4-way system also allows the dairyman to milk out cows that have abnormally wide teat placement or breakdown of the median suspensory ligament. It is not economical for the dairyman to sell a 2nd lactation cow that is giving 80 lbs. of milk just because her median suspensory ligament is broken down. The current economic problems being suffered by the dairy industry force the dairyman to milk the top off these cows before selling them. I also find that cows with uneven udders and light quarters are milked out more evenly with the 4-way system.

It should be mentioned that the use of a support arm is essential on almost all parlor milk systems in order to properly adjust the milk cluster to obtain even weight distribution on the teats by the milk cluster and thus, facilitates even milkout of all 4 quarters. Support arms greatly increase the effectiveness of the 4-way system in obtaining even milkout, especially in those cows with unbalanced udders.

The 4-way system, including the inflations, consists of medical grade silicone throughout its entire length up to the point where the 4-way extruded silicone hose is adapted to a single lumen hose just before entering the pipeline, automatic take-off sensor or weigh jar. The silicone inflation used on the 4-way system is the S-6,000 marketed by IBA, Inc. who also holds the marketing rights for the 4-way system. Extensive studies have been carried out on the silicone inflation using scanning electron microscopy (SEM), elemental analysis with X-ray microprobes (EDAX) and microbiological methods (1,2,3,4,5). These studies show that silicone is not porous, has a very smooth surface and does not accumulate the elements present in milk (Ca, Mg, Cl) or cleaning solutions used before and after milking (Cl, I). Silicone harbors less bacteria because of its non-porous surface and lasts much longer than a rubber inflation (6,000 milkings). A study done in the Brigham Young University dairy in a dual parlor facility revealed 3.75 clinical cases of mastitis in the parlor using rubber inflations, for every 1 case in the parlor using silicone inflations (4). The S-6,000 inflation has a clear, vented visicup on the end attaching to the milk tube. This allows the milker to observe each quarter individually as to whether it is milking out or not, and also allows immediate detection of a plugged air vent.

The Silicone tubing is also translucent and milk flow can be observed throughout the entire length of the 4-way system. Each individual milk tube from the inflation passes through a stainless steel frame which allows the vacuum to be shut-off to that particular milk tube when folded over a smooth rod within the frame. The 4 individual milk tubes are gathered together at the front of the unit at which point they are adapted to a single extruded silicone hose containing 4 individual holes within it. Therefore, the milk from each quarter never mixes until reaching the adaptor from the 4-way extruded silicone hose to the short single lumen hose at the automatic take-off sensor, pipeline or weigh jar. The 4-way system will be equipped with a stainless steel or heavy aluminum vacuum shut-off on the stainless steel takeoffs.

The pulsation used on the 4-way system is single pulsation with 45-50 pulsations per minute at a 60:40 pulsation ratio. Alternating pulsation is not necessary since its primary purpose is to decrease the amount of milk flowing through the milk outlet of the claw thus decreasing flooding of the milk hose and increasing vacuum stability at the teat end. Since there is a single milk hose for each quarter, alternating pulsation would not be required and may even be detrimental by causing a back and forth fluctuation of vacuum at the 4 to 1 adaptor located at the end of the 4-way extruded hose.

The 4-way system can be easily adapted to a backflushing system. However, iodine may not be used as the disinfectant in the backflush system because of its detrimental effects on silicone. Preliminary studies have indicated that plain water backflush on silicone is equally as effective when compared to an iodine backflush on rubber inflation because of the impervious nature of the silicone surface. One of the major milking equipment companies is currently testing a hot water backflush (150-160F) that could be used effectively on silicone without detrimental effects.

The 4-way system was initially installed on 12 dairies in 7 different states milking approximately 3,000 cows. Monthly quarter CMT's (California Mastitis Test) and composite somatic cell counts were monitored for the 1st six months. Most dairies were already on a mastitis control program before the installation of the 4-way system. Therefore, no other major changes in milking procedure, hygiene or equipment were made when the 4-way systems were installed. The number of cases of clinical mastitis significantly decreased along with the percent of cows in the herd that had quarters with CMT scores of 2 or 3. WMT (Wisconsin Mastitis Test) scores on bulk tank samples also decreased. However, during times of severe environmental changes, especially heavy rains, CMT and WMT scores would rise on some dairies.

This illustrates the important fact that no milking system will ever compensate for poor sanitation and improper milking procedure.

The 4-way milk system can be a valuable tool in a dairy herd health practice when implemented in a mastitis control program along with good management, cleanliness of housing areas, good sanitation, proper milking procedure and properly functioning milking equipment.

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1983 Convention, Oklahoma City

On January 28-29, 1983 the Program Committee met in Oklahoma City to plan the program, and other events, under the chairmanship of Dr. Jenks Britt, for the 1983 Convention in Oklahoma City, November 28-December 1.

XIII World Congress For Buiatrics, Durban, Republic of So. Africa: September 17 to 21, 1984

PROPOSED TOPICS

1. African diseases of Ruminants, domestic and wild and their global importance to the Cattle Industry.
   Note:
   i) Foot and mouth
   ii) Blue Tongue
   iii) Rift Valley Fever
   iv) Jaagsiekte

2. Herd Health Programmes under extensive and semi-extensive conditions. Facets which will be highlighted will include:
   i) The use of computer programmes
   ii) Herd reproduction control
   iii) Metabolic diseases in herd health
   iv) Mastitis control in herd health programmes
   v) The use of vaccines in herd health programmes
   vi) Diseases of the reproductive organs

3. New concepts in the control of *internal* and *external* parasites. Topics to be discussed will include:
   1. Biological control
   2. Immunological control
   3. Significance of parafilaria in beef *production*

4. Ticks and tick-borne diseases.
   Note:
   i) Heartwater
   ii) Babesiosis
   iii) Anaplasmosis

5. Bovine nutrition: the challenge of the 1980's: the competition between man and animal.

6. Toxicology:
   i) Plant toxins
   ii) Mycotoxins

7. Embryo transfer in the bovine in perspective.

8. Bovine orthopaedics.

9. Game ranching in conjunction with bovine:
   Note:
   i) disease transmission
   ii) translocation "stress syndrome"

10. *General*: Veterinary medicine and the individual animal: clinical communications.

Contact Dr. I. Bacher, P. O. Box 35333, Northcliff, South Africa 2115, Congress Organizing Chairman.