Vet Med Cooperative Extension

Connection

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Alternative Manure Management Program in California—2018 Update

In 2018, the California Department of Food and Agriculture's (CDFA) Alternative Manure Management Program (AMMP) provides financial support to improve manure management in dairy operations in California. Under the AMMP, financial assistance will be provided to implement non-digester manure management practices in California for reducing greenhouse gas emissions from livestock operations. CDFA received $99 million from the Greenhouse Gas Reduction Fund in 2017, and $19-$33 million will be allocated for AMMP in 2018. Between $61 and $75 million will be allocated under the Dairy Digester Research and Development Program (DDRDP) for building dairy digesters in California. For AMMP, the deadline to submit application and all the supporting information is May 22, 2018.

A team involving a group of faculty members from UC Davis is assisting CDFA to provide technical expertise for AMMP and DDRDP. Among other organizations (such as California Dairy Campaign (CDC), Earth First Living, Gold Ridge Resource Conservation District, Solana Center for Environmental Innovation, Humboldt County Resource Conservation District) University of California Cooperative Extension Specialist/AES Faculty, Dr. Pramod Pandey with the Department of Population Health and Reproduction, School of Veterinary Medicine organized a series of workshops (> 5) in Turlock, Hanford, Tulare, and Davis to cover the stakeholders from Fresno, Kings, Merced, Tulare, San Joaquin, Stanislaus, and Yolo Counties. These workshops were organized with the help from CDC, Innovative Ag Services, LLC, UC CE advisors, and a UC Davis Veterinarian and specialist. In addition to the dairy industry, livestock operations including poultry, goats, sheep, swine and horses are also eligible to obtain the funding as long as the proposed project involved the implementation of the proven technologies, which result in the reduction of greenhouse gas emissions from livestock manure.

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Trivia: Which livestock species was the second animal to be domesticated (after the dog) about *10,000 years ago* in Central Asia?

Answer from last edition: The average dairy cow produces 100 glasses of milk per day

Fertility Programs for *High Producing Dairy Cows* – Advances in First Service Timed-AI Programs

Twenty-one years have passed since the development of **Ovsynch**, the synchronization of ovulation program used worldwide (Figure 1). The main objectives of Ovsynch were to produce an optimal time for artificial insemination (AI) without necessity of detection of estrus (or heat) and improve fertility of lactating dairy cows. In the first studies introducing Ovsynch for lactating dairy cows, cows inseminated after timed-AI (TAI) had similar conception rates compared with cows inseminated following heat detection (approximately 38%). Since then, Ovsynch went through several modifications to optimize conception rates following timed-AI; these improvements in the Ovsynch protocol were only possible due to a better understanding of the physiological parameters that affect the success of timed-AI in lactating dairy cows.

The **key events for the success of the Ovsynch program** and to increase the chance of pregnancy after timed-AI are: **(1)** ovulation after the first administration of gonadotropin releasing hormone (GnRH) of the Ovsynch program; **(2)** presence of a corpus luteum (CL) at the beginning of the program or high circulating concentrations of progesterone during Ovsynch; **(3)** complete CL regression after prostaglandin F2a (PG) administration of Ovsynch; and **(4)** ovulation of an optimal size ovulatory follicle after timed-AI. Studies determined that a greater percentage of cows achieve these key events when the Ovsynch protocol is initiated on day 6 or 7 of the estrous cycle. Therefore, pre-synchronization programs were developed to increase the percentage of cows on day 6 or 7 of the estrous cycle at initiation of Ovsynch.

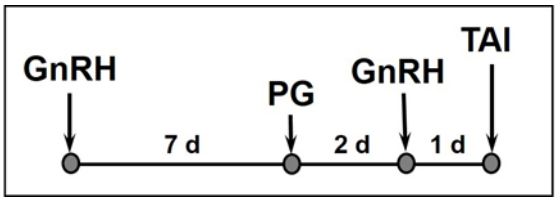

Figure 1: Original Ovsynch protocol in 1995. Ovsynch utilizes two hormone products: gonadotropin releasing hormone (GnRH) and prostaglandin F2α (PG). PG is also commonly called "lut" by dairy producers and workers in reference to the first commercial available PG product, Lutalyse. GnRH is used to cause ovulation of a follicle (ovarian structure that houses the egg) forming a corpus luteum (CL), which is a progesterone-producing ovarian structure in cows. PG has the function of regressing a CL, decreasing progesterone levels to basal or zero. TAI = timed-AI

Currently, the most successful pre-synchronization programs are: **Presynch-11 or 10, G6G and Double-Ovsynch** (Figure 2, next page). Studies showed that conception rates are greater for cows receiving first service timed-AI following these programs compared to Ovsynch without pre-synchronyzation or to AI following heat detection. A recent study showed that cows timed-AI following Double-Ovsynch had 10% greater conception rates for first service compared with AI following heat detection (49% vs. 39%, respectively) with similar average days in milk (77 days) at first AI. A difference of 13% was also found when a Presynch program was compared to Ovsynch without presynchronization (50% vs. 37%). Since these programs can enhance fertility of lactating dairy cows they are referred to as "fertility programs or treatments".

Another modification on the Ovsynch program that was adopted to increase conception rates was the addition of an extra PG injection 24 hours after the PG of Ovsynch. This extra injection decreased the percentage of cows with lack of CL regression at time of timed-AI. Recent studies indicated that between 10 and 20% of cows do not respond to the last PG of the Ovsynch program and have a lack of CL regression. Chance of pregnancy for cows that do not respond to this last PG injection is close to zero. This extra PG injection significantly increased the percentage of cows with CL regression (96% vs. 85%) and resulted in an increase of 3 to 5% in overall conception rate.

Presynch-10

M	Tu	W	Th	F	Sa	Su
				PG		
				PG		
GnRH						
PG (am)	PG (am)	GnRH (pm)	TAI (am)			

Presynch-11

M	Tu	W	Th	F	Sa	Su
			PG			
			PG			
GnRH						
PG (am)	PG (am)	GnRH (pm)	TAI (am)			

G6G

M	Tu	W	Th	F	Sa	Su
PG		GnRH				
	GnRH					
	PG (am)	PG (am)	GnRH (pm)	TAI (am)		

Double Ovsynch

M	Tu	W	Th	F	Sa	Su
				GnRH		
				PG		
GnRH						
GnRH						
PG (am)	PG (am)	GnRH (pm)	TAI (am)			

Figure 2: Calendars with recommended fertility programs: Presynch-10; Presynch-11; G6G; and Double-Ovsynch.

In summary, great improvements were made on synchronization of ovulation programs to enhance fertility of lactating dairy cows following timed-AI. Data from several controlled studies indicated that fertility treatments can achieve conception rates greater than 50% in high producing dairy cows. However, other factors such as heat stress, herd health and compliance to the protocol can contribute to the success of the program and need to be taken into consideration to enhance overall reproductive performance success.

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A Closer Look at Waste Milk Fed to Dairy Calves

An undesired consequence of the use of antimicrobial drugs in cattle is the presence of drug residues and/or metabolites in feces and urine, or in the milk of lactating animals. In lactating dairy cattle, this translates into production losses due to withholding of non-saleable waste milk containing drug residues. To avoid discarding this valuable product while reducing feed costs, many dairies feed waste milk to preweaned calves.

Regardless of the financial advantages of feeding waste milk to calves, an important question is whether this practice can affect the calves' health and result in unnecessary selection of antibiotic resistant bacteria that could reduce successful outcomes when treating infections with antibiotics.

We conducted a study to obtain an overview of drug residues present in waste milk fed to dairy calves, while also collecting herd management data that could provide information to better understand factors that could be associated with the presence of drug residues in milk and direct future research efforts.

Findings

A total of 25 dairies were sampled in this study and 15 had drug residues above the limit of detection in the waste milk sampled (**Table 1**). The most common drug residues detected in waste milk samples belonged to the cephalosporin antibiotic class, namely ceftiofur and cephapirin. Ceftiofur is present commercially in intramammary treatments (e.g. Spectramast LC, Spectramast DC), as well as in injectable drugs (e.g. Excenel, Excede, and Naxcel). Most injectable ceftiofur drugs, if used at the dose indicated in the label do not result in drug residues in the milk above the tolerance level established by the Food and Drug Administration (FDA). Based on answers from our questionnaire, ceftiofur was the most common drug used to treat mastitis, reproductive diseases, pneumonia, and lameness that warranted systemic antimicrobial treatment.

DRUG NAME	% Positive
BETA-LACTAM CLASS	
Ceftiofur	28 %
Cephapirin	12 %
Penicillin G	4%
TETRACYCLINE CLASS	
Tetracycline	4%
Oxytetracycline	12%
SULFONAMIDE	
Sulfadimethoxine	4%

Table 1. Percent distributions of drug residues in drug residue positive farms (n=15)

Cephapirin is also a cephalosporin that can be found in drugs used commercially for treatment of cows with mastitis (e.g. Today). Mastitis treatment is the most common use of antibiotics on dairy farms, therefore it is not surprising that most drug residues in waste milk are probably a consequence of treating cows with mastitis. This finding highlights even further the importance of management efforts to reduce

the cases of mastitis in the herd, including proper milking procedures (e.g. pre and post-dipping of teat with disinfectants, milking cows with contagious mastitis last and in a separate string), having mechanisms for identification and accurate treatment of cows with mastitis (e.g. routinely culturing fresh cows and cows returning from the hospital pen for mastitis and using drugs to treat mastitis according to bacteria cultured), and reducing environmental challenges (e.g. proper bedding, overall practices that result in cleaner udders).

Future Research

One of the future directions of our research team is to conduct studies to evaluate interventions that could reduce unwanted consequences of feeding waste milk, such as increasing resistance of disease causing bacteria. Currently there is very limited information on how pasteurization and/or other procedures may break down drug residues present in waste milk, extinguishing their unwanted properties. Our future studies will center efforts on that topic, and information from this study has provided important information on areas to focus. The success and relevance of the impact of our research is strongly based on a continued support and collaboration with dairy farmers, so we thank you for your help in this project and potential collaboration in future projects.

To simplify information, trade names of products have been used. No endorsement of named products is intended nor is criticism implied of similar products which are not mentioned.

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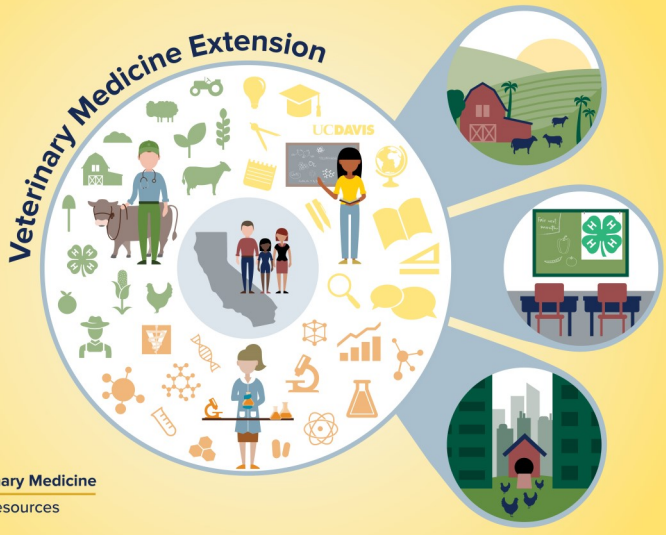

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