FOOD AND PRODUCTIVE EFFICIENCY OF DAIRY COWS RECEIVEING FEED FLORA REGULATORS ADDITIVES

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1. INTRODUCTION

Feed additives flora regulators are commonly used as supplementation in diets of dairy cows. As an example of these additives, we have the probiotics that are living microorganisms (HUBER, 1997), and the prebiotics, that stimulates the development of beneficial ruminal microflora and act as immunomodulators (SEMENIUK et al 2008). The most probiotic used to supplement dairy cows are live yeasts, mainly *Saccharomices cerevisae,* while the most prebiotic used are fermentation products by yeasts (POPPY et al, 2012). Besides that, other additive used in dairy cows is the *Aspergillus orizae*, however, your mode of action is still unclear (SALLAM et al, 2019).

Increased dry matter intake (DMI) in cows with yeasts supplementation has been observed (DANN et al, 2000), while SCHINGOETHE et al. (2004) observed decreased DMI. The use of prebiotics also did not have effect on DMI (HIGGINSON et al., 2018), but increased DMI was observed by DIAS et al (2018). In addition, the effect of yeasts on milk production increase is still controversial (DANN et al 2000; RAMSING, 2009). Therefore the aim of this study is to evaluate across a meta-analysis the effect of feed supplementation with different additives on milk production, intake, and body condition score of dairy cows.

2. METHODOLOGY

One hundred sixteen peer-reviewed publications using dairy cows supplemented with different additives were used for extraction and compiled data. It was evaluated the milk production (MP), dry matter intake (DMI), neutral detergent fiber intake (NDFI), acid detergent fiber intake (ADFI), body condition score (BCS), and apparent total tract digestibility of neutral detergent fiber (ATTD NFD). The variables were evaluated comparing dairy cows non supplemented (CONTROL) and supplemented with *Saccharomices Cerevisae* spp. (YEASTS), Prebiotics (PRE. i.e.yeast cell wall, β-glucans, MOS PRE), and *Aspergillus orizae* (AO).

Mix models regressing are used to perform the meta-analysis and the variables against the fixed effect of additives using the MIXED procedure of SAS (v. 9.4 SAS Institute Inc., Cary, NC). The study effect was considered as a random effect and included in the model using the RANDOM statement (ST-PIERRE, 2001). The standard error of means or number of replicates (animals) by treatment was used as the weighing factor in the model, using the weight statement of MIXED procedure of SAS. Covariates (days in milk (DIM) and neutral detergent fiber (NDF) content of diets) were kept in the model when significant ($P < 0.05$). Distribution of random effects was assumed to be normal and the restricted maximum likelihood (REML) was used as the method of estimation (SAS INSTITUTE INC., 2008). Differences between means were determined using the P-DIFF option of the LSMEANS statement, which is based on Fisher´s F-protected at least significant difference test. Significant differences were declared at $P \leq 0.05$

3. RESULTS AND DISCUSSION

The YEASTS increased MP by 7.16% and decreased DMI by 15% (*P* <0.0001; Table 1) compared to the control. Besides YEASTS decreased BCS (*P* = 0.0096; Table 1) compared with the control and PRE, though the average was within the expected values. The BCS represents a subjective assessment of the tissue reserves of dairy cows and is a tool for monitoring the balance between food management and the efficiency of cows uses food for milk production or body fat deposition (EDMONSON, 1989). The BCS is generally performed according 1 to 5 scale, being 1 very thin and 5 five very fat. This evaluation is made observing the deposit of fat on the ribs, loin and pelvis. The results show that even the dairy cows supplemented with YEATS consuming less dry matter and producing more milk, the energetic balance was not affected and the food efficiency of was improved.

The increase of food efficiency can be explained by improved of the rumen environmental with YEASTS, increasing rumen pH and apparent total tract digestibility of NDF (P < 0.0001; Table 1), even without affecting intake of ADF and NDF (*P*>0.05; Table 1). The oldest hypothesis of mechanisms of action of YEASTS in the rumen is that it acts directly enhancing fiber digestion and producing nutrients that stimulate growth of rumen bacteria, mainly cellulolytic bacteria. It has also been suggested that YEASTS acts in the rumen consuming mainly lactic acid, which in high concentrations is prejudicial to the rumen pH, reducing it, as well as the bacterial growth (CHAUCHEYRAS-DURAND et al, 2008). Other suggested is that YASTS uses the trace amounts of dissolved oxygen (ROSE, 1987) , improving the rumen osmolality, allowing passage of stronger volatile fat acids, increasing rumen pH and improving the rumen environmental to growth of microorganisms that degradate fiber (KOZLOSKI, 2019). These evidences explain the increase of ATTD NDF, pH and milk production, without affecting the intake of NDF.

4. CONCLUSIONS

The supplementation with YEASTS, specially live *Saccharomices cerevisae,* is an alternative to improve the food and productive efficiency and health of dairy cows.

1 Food and productive efficiency of dairy cows receiving feed flora regulators additives

Variable*	Additive				P-value	Sigma	
	AO	Control	Pre	Yeast	Treat	Study	Residual
MP[†] kg/d	33.1[bc]	32.5[c]	33.3[b]	34.8[a]	<.0001	44	0.512
± SEM	0.885	0.803	0.823	0.806			
DMI kg/d	22.1[a]	22.5[a]	22[a]	19.1[b]	<.0001	10.2	0.401
± SEM	0.751	0.461	0.646	0.464			
NDFI %	7.89	7.7	8.15	7.61	0.874	1.68	0.265
± SEM	0.565	0.429	0.977	0.429			
ADFI %		3.9	4.15	3.89	0.097	0.509	0.0063
± SEM		0.293	0.315	0.293			
BCS		2.936[b]	2.962[a]	2.89[b]	0.0096	0.104	0.0018
± SEM		0.062	0.062	0.064			
pH**	6.22[ab]	6.17[b]	6.19[b]	6.32[a]	<.0001	0.0852	0.00476
± SEM	0.0594	0.0542	0.0604	0.0555			
ATTD NDF[&]	45.5	47.2	44.6	48.0	<.0001	76.1	0.0419
± SEM	3.17	2.63	2.64	2.66			

[a-c] means followed by different letters at the same row show the effect of additive type (Fisher's test; P <0.05); *MP = milk production, DMI = dry matter intake, NDFI = neutral detergent fiber intake, ADFI = acid neutral fiber intake, BCS = body condition score, ATTD NDF = apparent total tract digestibility of neutral detergent fiber; [†] Days in milk and NDF diet content were used as covariate; **Diet neutral detergent fiber was considered a covariate in the model; [&] pH was considered as a covariate in the model.

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