EXPLORING THE SCOPE OF RABBIT GUT TRANSMITTED *SACCHAROMYCES CEREVISIAE* SUPPLEMENTATION TO RUMINANTS ON METHANE PRODUCTION IN PADDY STRAW BASED RATION

ELANTHAMIL, R.

(I.D.No. MVM 14014)

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DEPARTMENT OF ANIMAL NUTRITION

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MADRAS VETERINARY COLLEGE

CHENNAI – 600 007

CERTIFICATE

This is to certify that the thesis entitled **"EXPLORING THE SCOPE OF RABBIT GUT TRANSMITTED *SACCHAROMYCES CEREVISIAE* SUPPLEMENTATION TO RUMINANTS ON METHANE PRODUCTION IN PADDY STRAW BASED RATION"** submitted in partial fulfillment of the requirements for the degree of **Master of Veterinary Science** in **ANIMAL NUTRITION** to the **Tamil Nadu Veterinary and Animal Sciences University,** Chennai – 51, is a record of bonafide research work carried out by **ELANTHAMIL. R, MVM 14014 (ANN),**under my guidance and that no part of this thesis has been submitted for the award of any other degree, diploma fellowship or other similar titles or prizes and that the work has not been published in part or full in any scientific or popular journal or magazine.

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2. **(Dr. A.BHARATHIDHASAN)**

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EXTERNAL EXAMINER
Dr. D. NAGALAKSHMI

ABSTRACT

Title	:	**EXPLORING THE SCOPE OF RABBIT GUT TRANSMITTED *SACCHAROMYCES CEREVISIAE* SUPPLEMENTATION TO RUMINANTS ON METHANE PRODUCTION IN PADDY STRAW BASED RATION**
Name of the student	:	**ELANTHAMIL, R.**
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Name of the chairman	:	Dr. C.Bandeswaran, Ph.D.,
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A study was designed to explore the scope of rabbit gut transmitted (RGT) *Saccharomyces cerevisiae* on rumen fermentation and methane mitigation in ruminants. Procured *Saccharomyces cerevisiae* was propagated, freeze dried and supplemented to adult male New Zealand White rabbits (4 x 4) at various doses *viz.*, 0.0 x 10^8, 1.5 x 10^8, 3 x 10^8, 6 x 10^8 CFU / head / day for a period of 15 days. Significantly ($P<0.01$) highest *Saccharomyces cerevisiae* excretion in hard faeces of rabbits was observed at highest supplemental dose of *Saccharomyces cerevisiae* (3 x 10^8 CFU / head / day) at 15^{th} day post supplementation. Faecal isolate of *Saccharomyces cerevisiae* was confirmed for its origin (supplemental *Saccharomyces cerevisiae*) through morphological, biochemical and PCR assay. The faecal isolate was referred to as "RGT *Saccharomyces cerevisiae*". Both *Saccharomyces cerevisiae* and RGT *Saccharomyces cerevisiae* were assessed for their probiotic and prebiotic characters in seven replications. Probiotic characterization *viz.*, bile tolerance test and pH tolerance test showed that RGT *Saccharomyces cerevisiae* had significantly ($P<0.01$) higher bile tolerance (0.3, 0.6 and 0.9 per cent bile) and pH tolerance (pH 2) than *Saccharomyces cerevisiae*. Prebiotic characterization results showed that the MOS (0.5 per cent and 1.5 per cent) extracted from RGT *Saccharomyces cerevisiae*

significantly ($P<0.01$) improved *Lactobacillus acidophilus* growth. MOS derived from both *Saccharomyces cerevisiae* and RGT *Saccharomyces cerevisiae*, at all level of supplementation significantly ($P<0.01$) decreased the *Escherichia coli* growth. *In vitro* gas production studies using basal diet (paddy straw – 60 per cent and concentrate mixture – 40 per cent) supplemented with *Saccharomyces cerevisiae* and RGT *Saccharomyces cerevisiae* at 0.0×10^6, 0.5×10^6, 0.5×10^7 and 0.5×10^8 CFU (six replicates for each dose) revealed that both *Saccharomyces cerevisiae* and RGT *Saccharomyces cerevisiae* significantly ($P<0.01$) increased *in vitro* true dry matter degradability, total gas production, total volatile fatty acids production, propionate production, microbial population, microbial biomass production and significantly ($P<0.01$) decreased pH, ammonia nitrogen, acetate production, acetate : propionate ratio than the basal diet without supplementation of *Saccharomyces cerevisiae* and / or RGT *Saccharomyces cerevisiae*. On comparing between *Saccharomyces cerevisiae* and RGT *Saccharomyces cerevisiae*, RGT *Saccharomyces cerevisiae* significantly increased *in vitro* true dry matter degradability, total gas production, protozoa population and significantly decreased ammonia nitrogen than *Saccharomyces cerevisiae* at all the doses (0.5×10^6, 0.5×10^7 and 0.5×10^8 CFU) of supplementation. However, no significant variation was observed in methane production per 100 mg truly digested substrate.

It was concluded that in all supplemental dose of RGT *Saccharomyces cerevisiae,* methane production per 100 mg truly digested substrate was decreased numerically but not statistically.

Keywords: RGT *Saccharomyces cerevisiae,* Ruminants, Paddy straw based ration, *In vitro*, Methane production.