Comparing the *in vitro* proteolysis of feed proteins described with an exponential model using three different enzymatic methods

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Aim

Analyze the suitability of **Ørskov and McDonald** (1979) exponential model to describe the *in vitro* proteolysis by three enzymatic methods

Material and Methods

Method:

Aufrère and Cartailler (1988)

Enzyme:

Streptomyces *griseus* protease (SG)

Material and Methods

Method:

Tománková and Kopécny (1995)

Enzyme:

Bromelain

Material and Methods

Method:

Kosmala *et al.* (1996)

Enzyme:

Ficin

Material and Methods

Aufrère and Cartailler (1988)

Streptomyces *griseus* protease (SG)

Tománková and Kopécny (1995)

Bromelain

Kosmala et al. (1996)

Ficin

Material and Methods

Incubations conditions :

Enzyme	Buffer	pH	Enzyme: Substrate	Volume
SG	Borate - Phosphate	8.0	1:500	50
Bromelain	Phosphate	7.2	3:500	50
Ficin	Phosphate	7.0	2:500	40

Material and Methods

Protein supplements:

Soybean meal	SBM1, SBM2, SBM3
Groundnut meal	GNM1, GNM2
Coconut meal	CNM1, CNM2
Palm kernel meal	PKM1, PKM2
Cottonseed meal	CSM
Sunflower meal	SFM
Rapeseed meal	RSM

Material and Methods

Chemical composition

Protein supplements	NDF	CP	ADIN
	g/kg DM		g/kg N
Soybean meal	153	482	36
Groundnut meal	279	484	46
Coconut meal	606	221	166
Palm kernel meal	727	170	163
Cottonseed meal	268	431	46
Sunflower meal	454	303	63
Rapeseed meal	381	374	67

Material and Methods

Incubation times:

1, 2, 4, 6, 8, 24 and 48h

Material and Methods

Exponential model :

$$p = a + b(1 - e^{-ct})$$ **Ørskov and McDonald** (1979)

p - protein digested at time t

a - soluble protein fraction

b - insoluble protein fraction but potentially digested

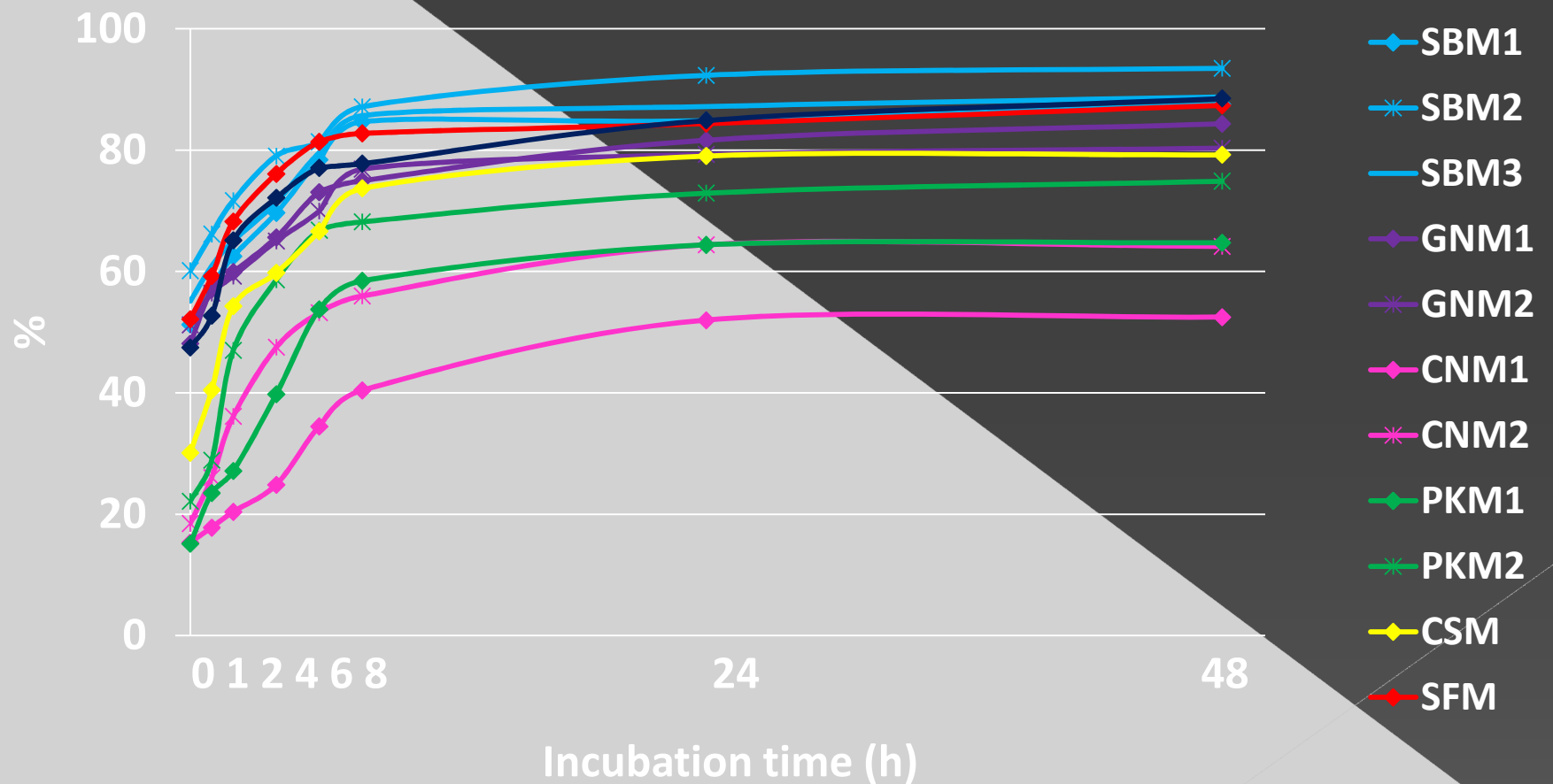c - digestion rate of fraction b (/h).

Results

Proteolysis kinetics:

Protein supplement ***

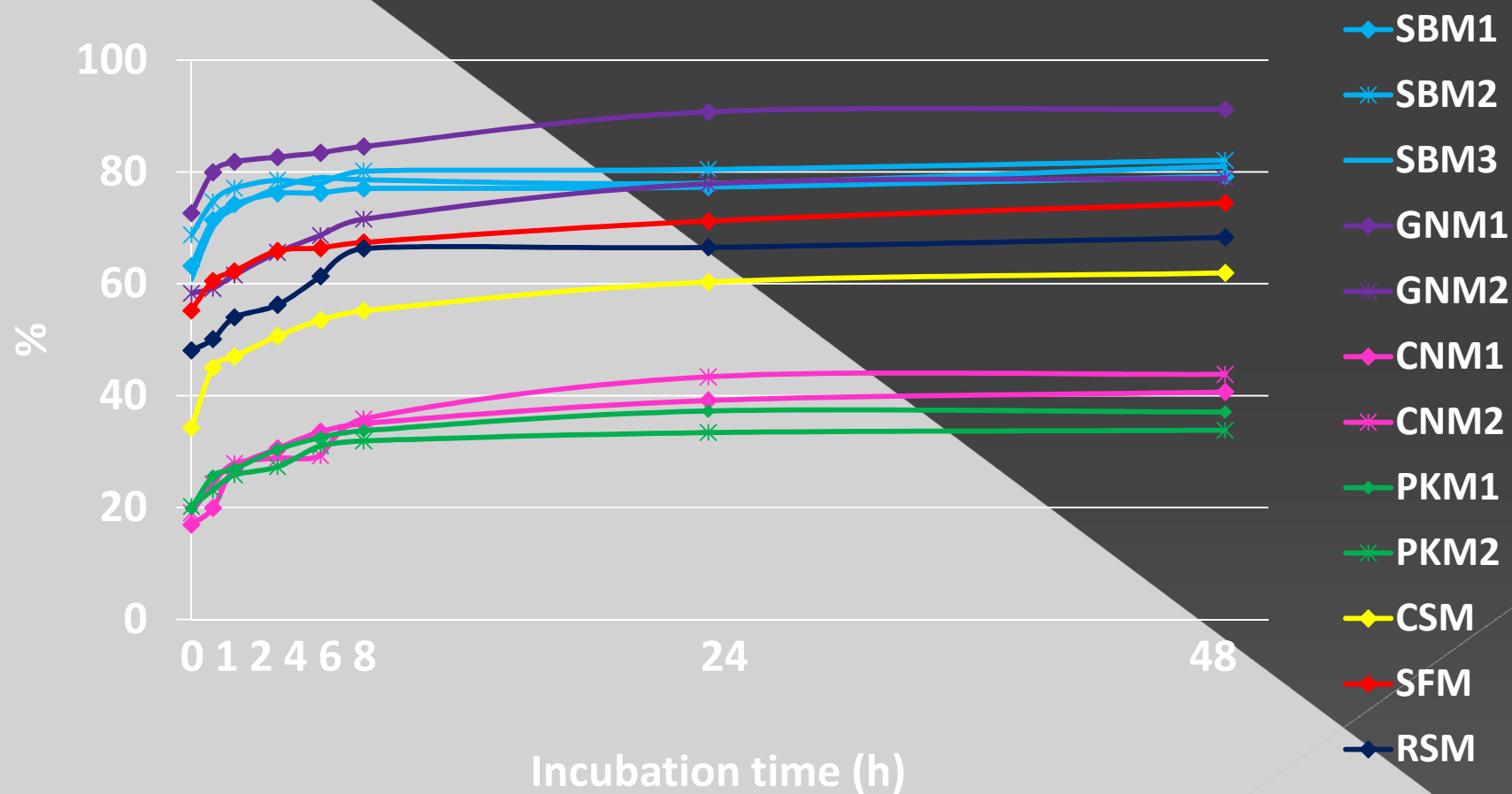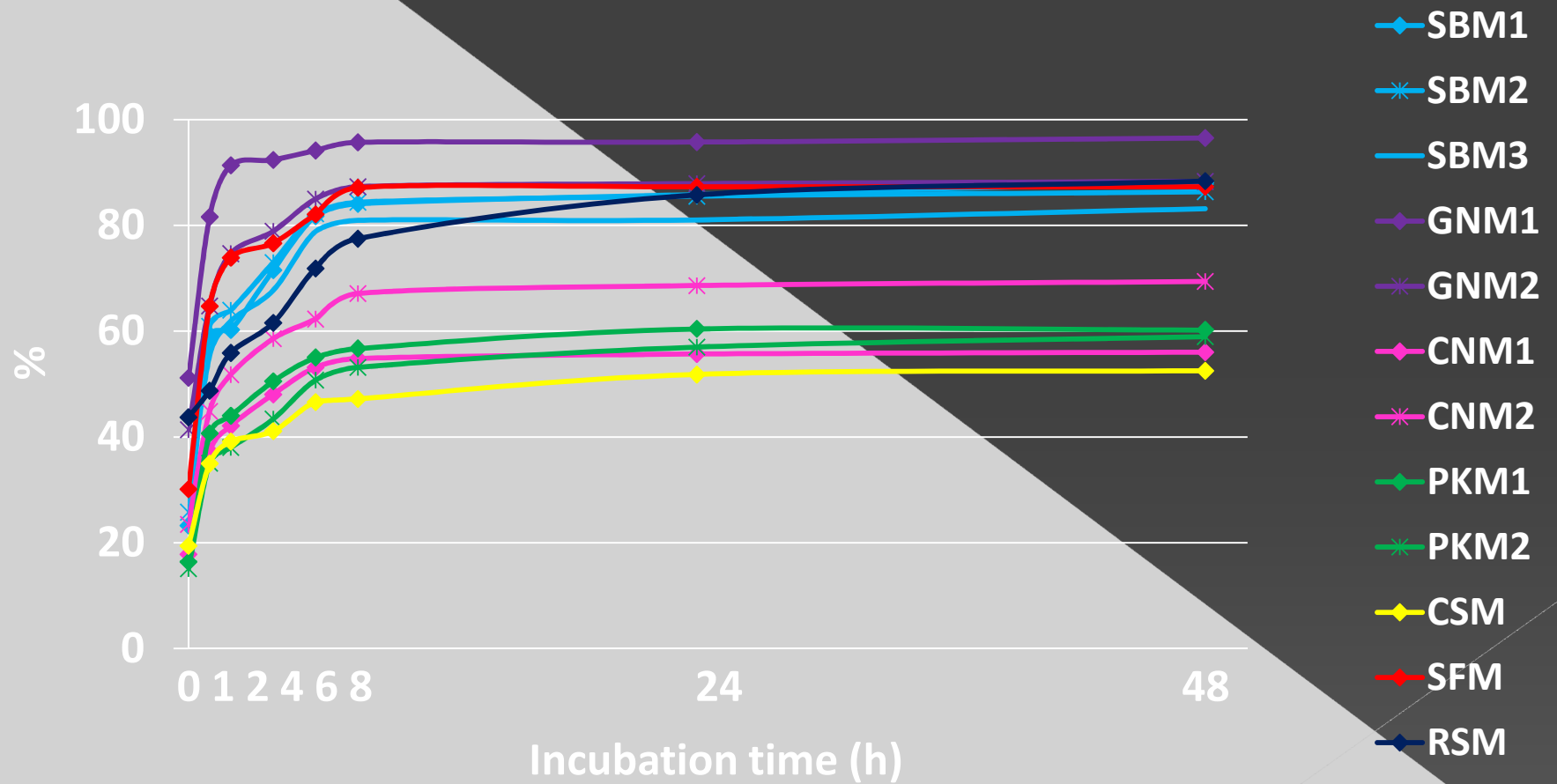**Method *****

M x PS ***

Results
Bromelain

Results

Ficin
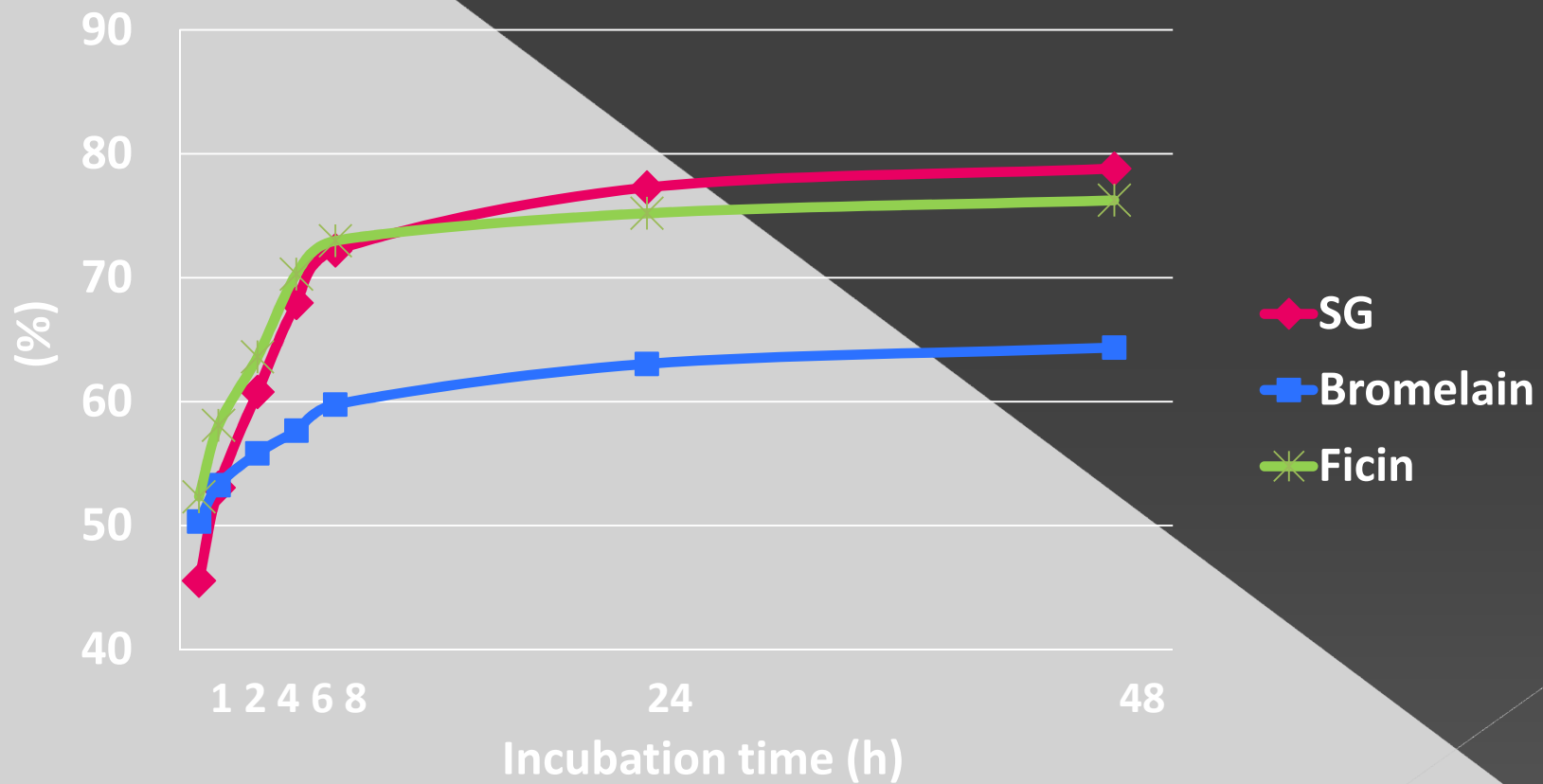
Results

Constants	Method			Effect		
	SG	Bromelain	Ficin	Method	Protein supplement	M x PS
a	36.2	46.5	27.7	***	***	***
b	42.9	19.7	48.2	***	***	***
a + b	79.2	66.2	76.0	***	***	***
c	0.20	0.24	0.34	***	***	***

Results

Protein solubility (a)

Bromelain > SG and Ficin   (P<0.05)

Extent of proteolysis (a + b)

Bromelain < SG and Ficin   (P<0.05)

Digestion rate (c)

Ficin > SG and Bromelain   (P<0.05)

Conclusions

The *in vitro* proteolysis of all three methods was well described by the exponential model

Significant different constants, derived from the model, were observed among methods

Future scope

Select the enzyme based method that can best estimate rumen *in sacco* protein degradation kinetics

Thank you
for your attention!!