

== Errata ==

THE RUMINANT NUTRITION SYSTEM

VOLUME II — TABLES OF EQUATIONS AND CODING

First Edition

November 14, 2025

The variables EWG and SWG in Equations 5 and 6 in **Table 5.2.5.2** were swapped.

5.2.5.2 Daily gains for growing or finishing cattle, sheep, and goats

#	Variable ⁽¹⁾	Description	Equation ⁽²⁾
1:	<i>EqSBW</i>	cattle	$SBW * \frac{SRW}{AFSBW}$
2:	<i>EqEBW</i>	cattle	$EqSBW * 0.891$
3:	<i>NEgr</i>	cattle	$(DMI - FFM) * NEga$
4:	<i>MEgr</i>	cattle	$\frac{NEgr}{k_g}$
5:	<i>EWG</i>	cattle	$13.91 * EqEBW^{-0.6837} * NEgr^{0.9116}$
6:	<i>SWG</i>	cattle	$12.341 * EqSBW^{-0.6837} * NEgr^{0.9116}$
7:	<i>PIG</i>	cattle	$\left(268 - 29.4 * \frac{NEgr}{SWG}\right) * 0.1$
8:	<i>NPgr</i>	cattle	$SWG * (PIG * 0.01) * 1000$
9:	<i>FIG</i>	cattle	$100 * \frac{NEgr - NPgr * 0.0057}{9.4 * SWG}$
10:		cattle: option 1	$If[EqSBW \leq 300, 0.834 - EqSBW * 0.00114, 0.492]$
11:		cattle: option 2	$If[EqSBW \leq 478, 0.834 - EqSBW * 0.00114, 0.289]$
12:	<i>E_{ff}^{MPtoNP}</i>	cattle: option 3	$0.492 + 104.93 * Exp(-0.0486 * SBW)$
13:		cattle: option 4	$0.112 + 2.271 * Exp(-0.01887 * EqSBW)$
14:	<i>MEgr</i>	sheep and goats	$DMI * [ME] - MEmr$
15:	<i>P</i>	sheep and goats	$\frac{FBW}{MFBW}$
16:	<i>R</i>	sheep and goats	$2 * (L - 1)$
17:	<i>PIG</i>	sheep and goats	$\left(\frac{212 - 4 * R - \frac{120 - 4 * R}{1 + Exp(-6 * (P - 0.4))}}{10}\right)$
18:	<i>FIG</i>	sheep and goats	$\left(\frac{43 + 28 * R + \frac{(490 - 28 * R)}{1 + Exp(-6 * (P - 0.4))}}{10}\right)$
19:	<i>RE_p</i>		$\frac{PIG * 5.7}{PIG * 5.7 + FIG * 9.4}$ 18.36
20:	<i>k_g</i>	sheep and goats	$\frac{27 + 41 * RE_p}{18.36}$
21:	<i>NEgr</i>	sheep and goats	$MEgr * k_g$
22:	<i>EVG</i>	sheep and goats	$6.7 + R + \left(\frac{(16.5 - R)}{1 + Exp(-6 * (P - 0.4))}\right)$ 4.184
23:	<i>SWG</i>	sheep and goats	$\frac{NEgr}{0.92 * EVG}$
24:	<i>EWG</i>	sheep and goats	$0.92 * SWG$
25:	<i>NPgr</i>	sheep and goats	$1000 * EWG * \left(\frac{PIG}{100}\right)$

#	Variable ⁽¹⁾	Description	Equation ⁽²⁾
26:	Eff_{MPToNP}	sheep and goats	0.7
27:	$MPgr$		$\frac{NPgr}{Eff_{MPToNP}}$
28:	$MAAgr$		$\frac{NPgr * \frac{TiAA_j}{100}}{Eff_{MPToNP}}$
29:	FFG		$\frac{MEgr}{[ME]}$

⁽¹⁾ **[ME]** is the dietary content of metabolizable energy, Mcal/kg; **AFFBW** is the adjusted final full body weight, which is the FBW at the same chemical fat composition as the standard reference weight (also known as the mature full body weight, **MFBW**), kg; **AFSBW** is the adjusted final shrunk body weight, which is the SBW at the same chemical fat composition as the standard reference weight (also known as the mature shrunk body weight, **MSBW**), kg; **DMI** is the dry matter intake, kg/d; Eff_{MPToNP} is the efficiency of conversion of metabolizable protein to net protein, dimensionless; **EqEBW** is the equivalent empty body weight, kg; **EqSBW** is the equivalent shrunk body weight, kg; **EVG** is the energy content of gain, Mcal/kg; **EWG** is the empty weight gain, kg/d; **FBW** is the full body weight, kg; **FFG** is the feed required for growth, kg/d; **FFM** is the feed required for maintenance, kg/d; **FIG** is the fat in the gain, %; k_g is the partial efficiency of utilization of metabolizable energy for net energy for growth, dimensionless; L_{DMI} is the level of intake as multiples of feed required for maintenance, dimensionless; **MEgr** is the metabolizable energy required for growth, Mcal/d; **MFBW** is the mature full body weight (also known as the adjusted final full body weight, **AFFBW**), kg; **MPgr** is the metabolizable protein required for growth, g/d; **MSBW** is the mature shrunk body weight (also known as the adjusted final shrunk body weight, **AFSBW**), kg; **NEga** is the dietary content of net energy available for growth (also known as **[NEg]**), Mcal/kg; **NEgr** is the net energy required for growth, Mcal/d; **NPgr** is the net protein required for growth, g/d; **PIG** is the protein in the gain, %; **R** a growth parameter, dimensionless; RE_p is the proportion of protein retained, dimensionless; **SBW** is the shrunk body weight, kg; **SRW** is the standard reference weight (default is 478 kg for replacement heifers), kg; **SWG** is the shrunk weight gain, kg/d; and **TiAA** is the jth tissue amino acid content (Arg: 6.6, His: 2.47, Ile: 2.84, Leu: 6.7, Lys: 6.37, Met: 1.97, Phe: 3.53, Thr: 3.9, Trp: 1.18, and Val: 4.03), %.

⁽²⁾ For cattle, there are four options to compute the efficiency of conversion of metabolizable protein to net protein (Eff_{MPToNP}): option 1 is based on the NRC (1996, 2000), option 2 is based on Fox et al. (2004), option 3 is based on the NASEM (2016), and option 4 is based on the RNS model (Tedeschi and Fox, 2020). These equations are also used for replacement females for sheep or goats.