



## 1 Supplement

### Parameters (Inputs)

Name	Description	Units	Type	Value
PaddockList	Gets or sets the list of paddock names. If the variable is not given, or if it has zero length, the component will autodetect paddocks by querying for modules that own the area variable.	-	String	System.String[[]]
SpoilageTime	Gets or sets the time over which an amount of supplement placed in a paddock will become inaccessible to grazing stock. Default value is 0.0, i.e. supplement only persists for the time step that it is fed out.	d	double	0

Name	Description	Units	Type	Value
Stores	Gets or sets the array of attributes and initial amount in each supplement store	-	List<StoreType>	Models.GrazPlan.StoreType[[]]

#### Properties (Outputs)

Name	Description	Units	Type	Settable?
Item			StoreType	False
Item			SupplementItem	False
NoPaddocks	Gets or set the number of paddocks recognised by the component instance	-	int32	False
NoStores	Gets or set the number of stores	-	int32	False
PaddAmounts	Gets the amount of supplement currently accessible to stock in each paddock recognised by the component instance	kg	double	False
PaddNames	Gets the name of each paddock recognised by the component instance	-	String	False
SuppToStock	Gets the amount and attributes of supplementary feed present in each paddock	-	List<SuppToStockType>	False

#### Links (Dependencies)

Name	Type	IsOptional?
animals	Stock	True
OutputSummary	ISummary	False

Name	Type	IsOptional?
simulation	Simulation	False

**Methods (callable from manager)**

Name	Description
Add	int32 Add(String suppName) <i>Adds the specified supp name.</i>
Add	int32 Add( <a href="#">FoodSupplement</a> supplement) <i>Adds the specified FoodSupplement.</i>
Buy	void Buy(double amount, String supplement) <i>Buys the specified amount.</i>
Conserve	void Conserve(String name, double freshWt, double DMContent, double dmd, double NConc, double PConc, double SConc, double AshAlk) <i>Conserves the specified name.</i>
Delete	void Delete(int32 idx) <i>Deletes the specified index.</i>
Feed	void Feed(String supplement, double amount, String paddock, boolean feedSuppFirst) <i>Feeds the specified supplement.</i>
FeedBegin	void FeedBegin(String name, String supplement, double amount, String paddock, boolean feedSuppFirst) <i>Begin feeding the specified supplement every day.</i>
FeedEnd	void FeedEnd(String name) <i>End feeding the specified supplement every day.</i>
IndexOf	int32 IndexOf( <a href="#">SupplementItem</a> item) <i>Returns the index of FoodSupplement in the array of supplements</i>

Name	Description
IndexOf	int32 IndexOf(String suppName) <i>Returns true if the currently named supplement is already in the mix</i>
Mix	void Mix(String source, double amount, String destination) <i>Mixes the specified source.</i>

## 2 StoreType

A stored supplement name and quantity

### Properties (Outputs)

Name	Description	Units	Type	Settable?
Name	Gets or sets the name.	-	String	True
Stored	Gets or sets the amount of supplement.	kg	double	True

## 3 SuppToStockType

Paddock and amount of ration

### Properties (Outputs)

Name	Description	Units	Type	Settable?
Amount	Gets or sets the amount of ration (kg).	kg	double	True
FeedSuppFirst	Gets or sets the flag to feed supplement before pasture. Bail feeding.	-	boolean	True
Paddock	Gets or sets the paddock name.	-	String	True

## 4 SupplementItem

A record to allow us to hold amount and cost information along with the FoodSupplement information In FoodSupplementItem, the "amount" should be read as kg of supplement fresh weight. and the cost should be per kg fresh weight.

### Properties (Outputs)

Name	Description	Units	Type	Settable?
Amount	Gets or sets the amount in kg.	kg	double	True
Cost	Gets or sets the cost.	-	double	True

#### Methods (callable from manager)

Name	Description
Assign	void Assign( <a href="#">SupplementItem</a> srcSupp)  <i>Assigns the specified source supp.</i>

## 5 Stock

### 5.1 Stock

The STOCK component encapsulates the GRAZPLAN animal biology model, as described in [M Freer et al., 1997](#).

[The GrazPlan animal model technical description](<https://grazplan.csiro.au/wp-content/uploads/2007/08/TechPaperMay12.pdf>)

Animals may be of different genotypes. In particular, sheep and cattle may be represented within a single STOCK instance.

Usually a single STOCK module is added to an AusFarm simulation, at the top level in the module hierarchy.

In a grazing system, however, there may be a variety of different classes of livestock. Animals may be of different genotypes (including both sheep and cattle); may be males, females or castrates; are likely to have a range of different ages; and females may be pregnant and/or lactating. The set of classes of livestock can change over time as animals enter or leave the system, are mated, give birth or are weaned. Further, animals that are otherwise similar may be placed in different paddocks, where their growth rates may differ.

Main Flock or Herd Index	1	2	3	4	5
Number of animals	2000	160	40	1500	300
Genotype	Merino	BL x Merino	BL x Merino	BL x Merino	BL x Merino
Sex	Wethers	Ewes	Ewes	Ewes	Ewes
Age	1.4 years	4.4 years	1.4 years	4.4 years	1.4 years
Base Weight	53.5 kg	51.4 kg	47.4 kg	48.6 kg	47.2 kg
Fleece Weight	2.23 kg	2.06 kg	1.78 kg	2.04 kg	1.74 kg
Number of offspring		1	1	1	1
Weight of foetus		2.7 kg	2.3 kg		
Paddock	"paddock_5"	"paddock_1"	"paddock_6"	"paddock_1"	"paddock_6"
Tag Value	2	1	1	1	1
Priority Score	3	2	1	2	1
Unweaned Offspring					
Number				1500	300
Genotype				(BL x M) x Dorset	(BL x M) x Dorset
Sex				Mixed Lambs	Mixed Lambs
Age				10 days	10 days
Base Weight				5.2 kg	4.7 kg
Fleece Weight				0.32 kg	0.30 kg

**Figure 1:** The list of animal groups at a particular time during a hypothetical simulation containing a STOCK module. Group 1 is distinct from the others because it has a different genotype and sex. Groups 2 and 3 are distinct because they are in different age classes (yearling vs mature). Groups 2 and 4 are distinct because they are in different reproductive states (pregnant vs lactating). Note how the unweaned lambs are associated with their mothers.

In the STOCK component, this complexity is handled by representing the set of animals in a simulated system as a list of animal groups (Figure 2.1). The members of each animal group have the same genotype and age class, but may have a range of ages (for example, an animal group containing mature animals may include four year old, five year old and six year old stock). The members of each animal group also have the same stage of pregnancy and/or lactation; the same number of suckling offspring; and occupy the same paddock.

The set of animal groups changes as animals enter and leave the simulation, and as physiological events such as maturation, mating, birth or weaning take place. Animal groups that become sufficiently similar are merged into a single group. The state of any unweaned lambs or calves is stored alongside that of their mothers; at weaning, the male and female weaners are transferred into two new animal groups within the main list.

In addition to the biological state variables that describe the animals, each animal group has four attributes that are of particular interest when writing management scripts.

## Index

Each animal group has a unique, internally assigned integer index, starting at 1. Because the set of groups present in a component instance is dynamic, the index number associated with a particular group of animals can – and usually does – change over time. This dynamic numbering scheme has consequences for the way that animals of a particular kind must be located when writing management scripts.

## Paddock

Each animal group is also assigned a paddock. The forage and supplementary feed available to a group of animals are determined by the paddock it occupies. Paddocks are referred to by name in the STOCK component:

- \* To set the paddock occupied by an animal group, use the **Move** event.
- \* To determine the paddock occupied by an animal group, use the **Paddock** variable.

It is the user's responsibility to ensure that paddock names correspond to PADDOCK modules or other sources of necessary driving variables.

### Tag Value

Each animal group also has a user assigned tag value that takes an integer value. Tag values have two purposes:

- \* They can be used to manage distinct groups of animals in a common fashion. For example, all lactating ewes might be assigned the same tag value, and then all animals with this tag value might undergo the same supplementary feeding regime.
- \* If tag values are assigned sequentially (starting at 1), they can be used to generate summary variables. For example, **WeightTag[1]** gives the average live weight of all animals in groups with a tag value of 1.

Note that animal groups with different tag values are never merged, even if they are otherwise similar.

- \* To set the tag value of an animal group, use the **Tag** method.
- \* To determine the tag value of an animal group, use the **TagNo** variable.

### Merging groups of similar animals

Animal groups that become sufficiently similar are merged into a single group. Animals are similar if all these are the same:

- \* Occupy the same paddock
- \* Reproduction status (Castrated, Male, Empty, Early Preg, Late Preg)
- \* Number of foetuses
- \* Mating cycle (day in the mating cycle)
- \* Days to mating (Days left in joining period)
- \* Pregnancy (Days since conception)
- \* Lactation status (Days since parturition (if lactating)) – within 7 days
- \* Has (not) young
- \* If young exist, their reproductive status must be the same
- \* Implants (hormone implants)
- \* Mean age (if the animals are less than one year old )

### Properties (Outputs)

Name	Description	Units	Type	Settable?
Age	Gets the age of animals by group.	d	double	False

Name	Description	Units	Type	Settable?
AgeAll	Gets the age of animals total	d	double	False
AgeMonths	Gets the age of animals, in months by group	month	double	False
AgeMonthsAll	Gets the age of animals, in months total	month	double	False
AgeMonthsTag	Gets the age of animals, in months by tag number	month	double	False
AgeMonthsYng	Gets the age of unweaned young animals, in months by group	month	double	False
AgeMonthsYngAll	Gets the age of unweaned young animals, in months total	month	double	False
AgeMonthsYngTag	Gets the age of unweaned young animals, in months by tag number	month	double	False

Name	Description	Units	Type	Settable?
AgeTag	Gets the age of animals by tag number	d	double	False
AgeYng	Gets the age of unweaned young animals by group	d	double	False
AgeYngAll	Gets the age of unweaned young animals total	d	double	False
AgeYngTag	Gets the age of unweaned young animals by tag number	d	double	False
AnimalGroups	List of animal groups.		IEnumerable< <a href="#">AnimalGroup</a> >	False
BaseWt	Gets the fleece-free, conceptus-free weight by group	kg	double	False
BaseWtAll	Gets the fleece-free, conceptus-free weight total	kg	double	False

Name	Description	Units	Type	Settable?
BaseWtEmpty	Gets the fleece-free, conceptus-free, empty body weight by group	kg	double	False
BaseWtTag	Gets the fleece-free, conceptus-free weight by tag number	kg	double	False
BaseWtYng	Gets the fleece-free, conceptus-free weight of unweaned young animals by group	kg	double	False
BaseWtYngAll	Gets the fleece-free, conceptus-free weight of unweaned young animals total	kg	double	False
BaseWtYngTag	Gets the fleece-free, conceptus-free weight of unweaned young animals by tag number	kg	double	False

Name	Description	Units	Type	Settable?
BirthCS	Gets the condition score at last parturition; zero if lactating=0, by group	-	double	False
BirthCSAll	Gets the condition score at last parturition; zero if lactating=0, total	-	double	False
BirthCSTag	Gets the condition score at last parturition; zero if lactating=0, by tag number	-	double	False
CFleeceGrowth	Gets the growth rate of clean fleece by group	kg/d	double	False
CFleeceGrowthAll	Gets the growth rate of clean fleece total	kg/d	double	False
CFleeceGrowthTag	Gets the growth rate of clean fleece by tag number	kg/d	double	False

Name	Description	Units	Type	Settable?
CFleeceGrowthYng	Gets the growth rate of clean fleece of unweaned young animals by group	kg/d	double	False
CFleeceGrowthYngAll	Gets the growth rate of clean fleece of unweaned young animals total	kg/d	double	False
CFleeceGrowthYngTag	Gets the growth rate of clean fleece of unweaned young animals by tag number	kg/d	double	False
CFleeceWt	Gets the current clean fleece weight by group	kg	double	False
CFleeceWtAll	Gets the current clean fleece weight total	kg	double	False
CFleeceWtTag	Gets the current clean fleece weight by tag number	kg	double	False

Name	Description	Units	Type	Settable?
CFleeceWtYng	Gets the current clean fleece weight of unweaned young animals by group	kg	double	False
CFleeceWtYngAll	Gets the current clean fleece weight of unweaned young animals total	kg	double	False
CFleeceWtYngTag	Gets the current clean fleece weight of unweaned young animals by tag number	kg	double	False
CondScore	Gets the condition score of animals (1-5 scale) by group	-	double	False
CondScoreAll	Gets the condition score of animals (1-5 scale) total	-	double	False

Name	Description	Units	Type	Settable?
CondScoreTag	Gets the condition score of animals (1-5 scale) by tag number	-	double	False
CondScoreYng	Gets the condition score of unweaned young animals (1-5 scale) by group	-	double	False
CondScoreYngAll	Gets the condition score of unweaned young animals (1-5 scale) total	-	double	False
CondScoreYngTag	Gets the condition score of unweaned young animals (1-5 scale) by tag number	-	double	False
CPIntake	Gets the crude protein intake per head by group	kg/d	double	False

Name	Description	Units	Type	Settable?
CPIntakeAll	Gets the crude protein intake per head total	kg/d	double	False
CPIntakeTag	Gets the crude protein intake per head by tag number	kg/d	double	False
CPIntakeYng	Gets the crude protein intake per head of unweaned young animals by group	kg/d	double	False
CPIntakeYngAll	Gets the crude protein intake per head of unweaned young animals total	kg/d	double	False
CPIntakeYngTag	Gets the crude protein intake per head of unweaned young animals by tag number	kg/d	double	False

Name	Description	Units	Type	Settable?
Deaths	Gets the deaths of non suckling animals in each group	-	int32	False
DeathsAll	Gets the deaths of all non suckling animals	-	int32	False
DeathsTag	Gets the deaths of non suckling animals in each tag group	-	int32	False
DSE	Gets the dry sheep equivalents, based on potential intake by group	-	double	False
DSEAll	Gets the dry sheep equivalents, based on potential intake total	-	double	False
DSETag	Gets the dry sheep equivalents, based on potential intake by tag number	-	double	False

Name	Description	Units	Type	Settable?
DSEYng	Gets the dry sheep equivalents, based on potential intake of unweaned young animals by group	-	double	False
DSEYngAll	Gets the dry sheep equivalents, based on potential intake of unweaned young animals total	-	double	False
DSEYngTag	Gets the dry sheep equivalents, based on potential intake of unweaned young animals by tag number	-	double	False
EnergyUse	Gets the metabolizable energy use for each animal group	-	List<EnergyUse>	False

Name	Description	Units	Type	Settable?
Faeces	Gets the faecal dry matter and nutrients per head by each animal group	-	List<DMPoolHead>	False
FaecesAll	Gets the faecal dry matter and nutrients per head	-	DMPoolHead	False
FaecesInorg	Gets the inorganic nutrients excreted in faeces, per head by each animal group	-	List<InorgFaeces>	False
FaecesInorgAll	Gets the inorganic nutrients excreted in faeces, per head	-	InorgFaeces	False
FaecesInorgTag	Gets the inorganic nutrients excreted in faeces, per head by tag	-	List<InorgFaeces>	False

Name	Description	Units	Type	Settable?
FaecesInorgYng	Gets the inorganic nutrients excreted in faeces, per head of unweaned animals by group	-	List<InorgFaeces>	False
FaecesInorgYngAll	Gets the inorganic nutrients excreted in faeces, per head of unweaned animals	-	InorgFaeces	False
FaecesInorgYngTag	Gets the inorganic nutrients excreted in faeces, per head of unweaned animals by tag	-	List<InorgFaeces>	False
FaecesTag	Gets the faecal dry matter and nutrients per head by tag	-	List<DMPoolHead>	False
FaecesYng	Gets the faecal dry matter and nutrients per head of unweaned animals by group	-	List<DMPoolHead>	False

Name	Description	Units	Type	Settable?
FaecesYngAll	Gets the faecal dry matter and nutrients per head of unweaned animals	-	DMPoolHead	False
FaecesYngTag	Gets the faecal dry matter and nutrients per head of unweaned animals by tag	-	List<DMPoolHead>	False
FibreDiam	Gets the current average wool fibre diameter by group	um	double	False
FibreDiamAll	Gets the current average wool fibre diameter total	um	double	False
FibreDiamTag	Gets the current average wool fibre diameter by tag number	um	double	False

Name	Description	Units	Type	Settable?
FibreDiamYng	Gets the current average wool fibre diameter of unweaned young animals by group	um	double	False
FibreDiamYngAll	Gets the current average wool fibre diameter of unweaned young animals total	um	double	False
FibreDiamYngTag	Gets the current average wool fibre diameter of unweaned young animals by tag number	um	double	False
FibreGrowthDiam	Gets the fibre diameter of the current day's wool growth by group	um	double	False
FibreGrowthDiamAll	Gets the fibre diameter of the current day's wool growth total	um	double	False

Name	Description	Units	Type	Settable?
FibreGrowthDiamTag	Gets the fibre diameter of the current day's wool growth by tag number	um	double	False
FibreGrowthDiamYng	Gets the fibre diameter of the current day's wool growth of unweaned young animals by group	um	double	False
FibreGrowthDiamYngAll	Gets the fibre diameter of the current day's wool growth of unweaned young animals total	um	double	False
FibreGrowthDiamYngTag	Gets the fibre diameter of the current day's wool growth of unweaned young animals by tag number	um	double	False

Name	Description	Units	Type	Settable?
FleeceWt	Gets the current greasy fleece weight by group	kg	double	False
FleeceWtAll	Gets the current greasy fleece weight total	kg	double	False
FleeceWtTag	Gets the current greasy fleece weight by tag number	kg	double	False
FleeceWtYng	Gets the current greasy fleece weight of unweaned young animals by group	kg	double	False
FleeceWtYngAll	Gets the current greasy fleece weight of unweaned young animals total	kg	double	False

Name	Description	Units	Type	Settable?
FleeceWtYngTag	Gets the current greasy fleece weight of unweaned young animals by tag number	kg	double	False
Genotypes	An instance that contains all stock genotypes.		<a href="#">Genotypes</a>	False
Intake	Gets the total intake per head of dry matter and nutrients by each animal group	-	List< <a href="#">DMPoolHead</a> >	False
IntakeAll	Gets the total intake per head of dry matter and nutrients	-	<a href="#">DMPoolHead</a>	False
IntakeModifier	Gets the externally-imposed scaling factor for potential intake (0-1.0). This property is resettable by group	-	double	False

Name	Description	Units	Type	Settable?
IntakeModifierAll	Gets the externally-imposed scaling factor for potential intake (0-1.0). This property is resettable, total	-	double	False
IntakeModifierTag	Gets the externally-imposed scaling factor for potential intake (0-1.0). This property is resettable by tag number	-	double	False
IntakeModifierYng	Gets the externally-imposed scaling factor for potential intake (0-1.0). This property is resettable, of unweaned young animals by group	-	double	False

Name	Description	Units	Type	Settable?
IntakeModifierYngAll	Gets the externally-imposed scaling factor for potential intake (0-1.0). This property is resettable, of unweaned young animals total	-	double	False
IntakeModifierYngTag	Gets the externally-imposed scaling factor for potential intake (0-1.0). This property is resettable, of unweaned young animals by tag number	-	double	False
IntakeTag	Gets the total intake per head of dry matter and nutrients by tag	-	List<DMPoolHead>	False

Name	Description	Units	Type	Settable?
IntakeYng	Gets the total intake per head of dry matter and nutrients of unweaned animals by group	-	List<DMPoolHead>	False
IntakeYngAll	Gets the total intake per head of dry matter and nutrients of unweaned animals	-	DMPoolHead	False
IntakeYngTag	Gets the total intake per head of dry matter and nutrients of unweaned animals by tag	-	List<DMPoolHead>	False
Lactating	Gets the lactation status. If the animals are lactating, the number of days since birth of the lamb or calf; zero otherwise, by group	d	double	False

Name	Description	Units	Type	Settable?
LactatingAll	Gets the lactation status. If the animals are lactating, the number of days since birth of the lamb or calf; zero otherwise, total	d	double	False
LactatingTag	Gets the lactation status. If the animals are lactating, the number of days since birth of the lamb or calf; zero otherwise, by tag number	d	double	False
MaxPrevWt	Gets the maximum previous basal weight (fleece-free, conceptus-free) attained by each animal group	kg	double	False

Name	Description	Units	Type	Settable?
MaxPrevWtAll	Gets the maximum previous basal weight (fleece-free, conceptus-free) attained total	kg	double	False
MaxPrevWtTag	Gets the maximum previous basal weight (fleece-free, conceptus-free) attained by tag number	kg	double	False
MaxPrevWtYng	Gets the maximum previous basal weight (fleece-free, conceptus-free) attained of unweaned young animals by group	kg	double	False

Name	Description	Units	Type	Settable?
MaxPrevWtYngAll	Gets the maximum previous basal weight (fleece-free, conceptus-free) attained unweaned young animals total	kg	double	False
MaxPrevWtYngTag	Gets the maximum previous basal weight (fleece-free, conceptus-free) attained of unweaned young animals by tag number	kg	double	False
MEIntake	Gets the intake per head of metabolizable energy by group	MJ/d	double	False
MEIntakeAll	Gets the intake per head of metabolizable energy total	MJ/d	double	False

Name	Description	Units	Type	Settable?
MEIntakeTag	Gets the intake per head of metabolizable energy by tag number	MJ/d	double	False
MEIntakeYng	Gets the intake per head of metabolizable energy of unweaned young animals by group	MJ/d	double	False
MEIntakeYngAll	Gets the intake per head of metabolizable energy of unweaned young animals total	MJ/d	double	False
MEIntakeYngTag	Gets the intake per head of metabolizable energy of unweaned young animals by tag number	MJ/d	double	False
Methane	Gets the output of methane (per head) by group	kg/d	double	False

Name	Description	Units	Type	Settable?
MethaneAll	Gets the output of methane (per head) total	kg/d	double	False
MethaneTag	Gets the output of methane (per head) by tag number	kg/d	double	False
MethaneYng	Gets the output of methane (per head) of unweaned young animals by group	kg/d	double	False
MethaneYngAll	Gets the output of methane (per head) of unweaned young animals total	kg/d	double	False
MethaneYngTag	Gets the output of methane (per head) of unweaned young animals by tag number	kg/d	double	False

Name	Description	Units	Type	Settable?
MilkME	Gets the metabolizable energy produced in milk (per head) by each animal group by group	MJ/d	double	False
MilkMEAll	Gets the metabolizable energy produced in milk (per head) by each animal group total	MJ/d	double	False
MilkMETag	Gets the metabolizable energy produced in milk (per head) by each animal group by tag number	MJ/d	double	False
MilkWt	Gets the weight of milk produced per head, on a 4pc fat-corrected basis by group	kg/d	double	False

Name	Description	Units	Type	Settable?
MilkWtAll	Gets the weight of milk produced per head, on a 4pc fat-corrected basis total	kg/d	double	False
MilkWtTag	Gets the weight of milk produced per head, on a 4pc fat-corrected basis by tag number	kg/d	double	False
NoFemale	Gets the number of female animals in each group	-	int32	False
NoFemaleAll	Gets the total number of female animals	-	int32	False
NoFemaleTag	Gets the number of female animals in each tag group	-	int32	False
NoFemaleYng	Gets the number of unweaned female animals in each group	-	int32	False

Name	Description	Units	Type	Settable?
NoFemaleYngAll	Gets the total number of unweaned female animals	-	int32	False
NoFemaleYngTag	Gets the number of unweaned female animals in each tag group	-	int32	False
NoFoetuses	Gets the number of foetuses per head by group	-	double	False
NoFoetusesAll	Gets the number of foetuses per head total	-	double	False
NoFoetusesTag	Gets the number of foetuses per head by tag number	-	double	False
NoGroups	Gets the number of animal groups	-	int32	False
NoMale	Gets the number of male animals in each group	-	int32	False

Name	Description	Units	Type	Settable?
NoMaleAll	Gets the total number of male animals	-	int32	False
NoMaleTag	Gets the number of male animals in each tag group	-	int32	False
NoMaleYng	Gets the number of unweaned male animals in each group	-	int32	False
NoMaleYngAll	Gets the total number of unweaned male animals	-	int32	False
NoMaleYngTag	Gets the number of unweaned male animals in each tag group	-	int32	False
NoSuckling	Gets the number of unweaned lambs or calves per head by group	-	double	False

Name	Description	Units	Type	Settable?
NoSucklingAll	Gets the number of unweaned lambs or calves per head total	-	double	False
NoSucklingTag	Gets the number of unweaned lambs or calves per head by tag number	-	double	False
Number	Gets the number of animals in each group	-	int32	False
NumberAll	Gets the total number of animals	-	int32	False
NumberTag	Gets the number of animals in each tag group	-	int32	False
NumberYng	Gets the number of unweaned young animals in each group	-	int32	False
NumberYngAll	Gets the total number of unweaned young animals	-	int32	False

Name	Description	Units	Type	Settable?
NumberYngTag	Gets the number of unweaned young animals in each group	-	int32	False
Paddock	Gets the paddock occupied by each animal group	-	String	False
PastIntake	Gets the intake per head of pasture dry matter and nutrients by each animal group	-	List<DMPoolHead>	False
PastIntakeAll	Gets the intake per head of pasture dry matter and nutrients	-	DMPoolHead	False
PastIntakeTag	Gets the intake per head of pasture dry matter and nutrients by tag	-	List<DMPoolHead>	False

Name	Description	Units	Type	Settable?
PastIntakeYng	Gets the intake per head of pasture dry matter and nutrients of unweaned animals by group	-	List<DMPoolHead>	False
PastIntakeYngAll	Gets the intake per head of pasture dry matter and nutrients of unweaned animals	-	DMPoolHead	False
PastIntakeYngTag	Gets the intake per head of pasture dry matter and nutrients of unweaned animals by tag	-	List<DMPoolHead>	False
Pregnant	Gets the pregnancy status. If the animals are pregnant, the number of days since conception; zero otherwise, by group	d	double	False

Name	Description	Units	Type	Settable?
PregnantAll	Gets the the pregnancy status. If the animals are pregnant, the number of days since conception; zero otherwise, total	d	double	False
PregnantTag	Gets the the pregnancy status. If the animals are pregnant, the number of days since conception; zero otherwise, by tag number	d	double	False
RandSeed	The seed for the random number generator. Used when computing numbers of animals dying and conceiving from the equations for mortality and conception rates.		int32	True

Name	Description	Units	Type	Settable?
RDPFactor	Gets the effect of rumen-degradable protein availability on rate of intake (1 = no limitation to due lack of RDP) by group	0-1	double	False
RDPFactorAll	Gets the effect of rumen-degradable protein availability on rate of intake (1 = no limitation to due lack of RDP) total	0-1	double	False
RDPFactorTag	Gets the effect of rumen-degradable protein availability on rate of intake (1 = no limitation to due lack of RDP) by tag number	0-1	double	False

Name	Description	Units	Type	Settable?
RDPFactorYng	Gets the effect of rumen-degradable protein availability on rate of intake (1 = no limitation to due lack of RDP) of unweaned young animals by group	0-1	double	False
RDPFactorYngAll	Gets the effect of rumen-degradable protein availability on rate of intake (1 = no limitation to due lack of RDP) of unweaned young animals total	0-1	double	False

Name	Description	Units	Type	Settable?
RDPFactorYngTag	Gets the effect of rumen-degradable protein availability on rate of intake (1 = no limitation to due lack of RDP) of unweaned young animals by tag number	0-1	double	False
RDPIntake	Gets the intake per head of rumen-degradable protein by group	kg/d	double	False
RDPIntakeAll	Gets the intake per head of rumen-degradable protein total	kg/d	double	False
RDPIntakeTag	Gets the intake per head of rumen-degradable protein by tag number	kg/d	double	False

Name	Description	Units	Type	Settable?
RDPIntakeYng	Gets the intake per head of rumen-degradable protein of unweaned young animals by group	kg/d	double	False
RDPIntakeYngAll	Gets the intake per head of rumen-degradable protein of unweaned young animals total	kg/d	double	False
RDPIntakeYngTag	Gets the intake per head of rumen-degradable protein of unweaned young animals by tag number	kg/d	double	False
RDPreqd	Gets the requirement per head of rumen-degradable protein by group	kg/d	double	False

Name	Description	Units	Type	Settable?
RDPReqdAll	Gets the requirement per head of rumen-degradable protein total	kg/d	double	False
RDPReqdTag	Gets the requirement per head of rumen-degradable protein by tag number	kg/d	double	False
RDPReqdYng	Gets the requirement per head of rumen-degradable protein of unweaned young animals by group	kg/d	double	False
RDPReqdYngAll	Gets the requirement per head of rumen-degradable protein of unweaned young animals total	kg/d	double	False

Name	Description	Units	Type	Settable?
RDPRreqdYngTag	Gets the requirement per head of rumen-degradable protein of unweaned young animals by tag number	kg/d	double	False
RetainedN	Gets the nitrogen retained within the animals, on a per-head basis by group	kg/d	double	False
RetainedNAll	Gets the nitrogen retained within the animals, on a per-head basis total	kg/d	double	False
RetainedNTag	Gets the nitrogen retained within the animals, on a per-head basis by tag number	kg/d	double	False

Name	Description	Units	Type	Settable?
RetainedNYng	Gets the nitrogen retained within the animals, on a per-head basis of unweaned young animals by group	kg/d	double	False
RetainedNYngAll	Gets the nitrogen retained within the animals, on a per-head basis of unweaned young animals total	kg/d	double	False
RetainedNYngTag	Gets the nitrogen retained within the animals, on a per-head basis of unweaned young animals by tag number	kg/d	double	False
RetainedP	Gets the phosphorus retained within the animals, on a per-head basis by group	kg/d	double	False

Name	Description	Units	Type	Settable?
RetainedPAll	Gets the phosphorus retained within the animals, on a per-head basis total	kg/d	double	False
RetainedPTag	Gets the phosphorus retained within the animals, on a per-head basis by tag number	kg/d	double	False
RetainedPYng	Gets the phosphorus retained within the animals, on a per-head basis of unweaned young animals by group	kg/d	double	False
RetainedPYngAll	Gets the phosphorus retained within the animals, on a per-head basis of unweaned young animals total	kg/d	double	False

Name	Description	Units	Type	Settable?
RetainedPYngTag	Gets the phosphorus retained within the animals, on a per-head basis of unweaned young animals by tag number	kg/d	double	False
RetainedS	Gets the sulphur retained within the animals, on a per-head basis by group	kg/d	double	False
RetainedSAll	Gets the sulphur retained within the animals, on a per-head basis total	kg/d	double	False
RetainedSTag	Gets the sulphur retained within the animals, on a per-head basis by tag number	kg/d	double	False

Name	Description	Units	Type	Settable?
RetainedSYng	Gets the sulphur retained within the animals, on a per-head basis of unweaned young animals by group	kg/d	double	False
RetainedSYngAll	Gets the sulphur retained within the animals, on a per-head basis of unweaned young animals total	kg/d	double	False
RetainedSYngTag	Gets the sulphur retained within the animals, on a per-head basis of unweaned young animals by tag number	kg/d	double	False

Name	Description	Units	Type	Settable?
Sex	Gets the sex field of the sheep and cattle initialisation variables. [wether   ram   steer   bull   ewe   heifer   cow]	-	String	False
StockModel	Gives access to the list of animals. Needed for unit testing.		<a href="#">StockList</a>	True
SuppEaten	Gets the consumption of supplementary feed by animals	-	List< <a href="#">SupplementEaten</a> >	False
SuppIntake	Gets the intake per head of supplement dry matter and nutrients by each animal group	-	List< <a href="#">DMPoolHead</a> >	False
SuppIntakeAll	Gets the intake per head of supplement dry matter and nutrients	-	<a href="#">DMPoolHead</a>	False

Name	Description	Units	Type	Settable?
SuppIntakeTag	Gets the intake per head of supplement dry matter and nutrients by tag	-	List<DMPoolHead>	False
SuppIntakeYng	Gets the intake per head of supplement dry matter and nutrients of unweaned animals by group	-	List<DMPoolHead>	False
SuppIntakeYngAll	Gets the intake per head of supplement dry matter and nutrients of unweaned animals	-	DMPoolHead	False
SuppIntakeYngTag	Gets the intake per head of supplement dry matter and nutrients of unweaned animals by tag	-	List<DMPoolHead>	False

Name	Description	Units	Type	Settable?
TagNo	Gets the tag value assigned to each animal group	-	int32	False
Trampling	Mass of grazers per unit area This returns the kg/ha of all paddocks in the order stored in the Stock component.	kg/ha	double	False
UrineN	Gets the urinary nitrogen output per head by group	kg/d	double	False
UrineNAll	Gets the urinary nitrogen output per head total	kg/d	double	False
UrineNTag	Gets the urinary nitrogen output per head by tag number	kg/d	double	False

Name	Description	Units	Type	Settable?
UrineNYng	Gets the urinary nitrogen output per head of unweaned young animals by group	kg/d	double	False
UrineNYngAll	Gets the urinary nitrogen output per head of unweaned young animals total	kg/d	double	False
UrineNYngTag	Gets the urinary nitrogen output per head of unweaned young animals by tag number	kg/d	double	False
UrineP	Gets the urinary phosphorus output per head by group	kg/d	double	False
UrinePAll	Gets the urinary phosphorus output per head total	kg/d	double	False

Name	Description	Units	Type	Settable?
UrinePtag	Gets the urinary phosphorus output per head by tag number	kg/d	double	False
UrinePYng	Gets the urinary phosphorus output per head of unweaned young animals by group	kg/d	double	False
UrinePYngAll	Gets the urinary phosphorus output per head of unweaned young animals total	kg/d	double	False
UrinePYngTag	Gets the urinary phosphorus output per head of unweaned young animals by tag number	kg/d	double	False
UrineS	Gets the urinary sulphur output per head by group	kg/d	double	False

Name	Description	Units	Type	Settable?
UrineSAll	Gets the urinary sulphur output per head total	kg/d	double	False
UrineSTag	Gets the urinary sulphur output per head by tag number	kg/d	double	False
UrineSYng	Gets the urinary sulphur output per head of unweaned young animals by group	kg/d	double	False
UrineSYngAll	Gets the urinary sulphur output per head of unweaned young animals total	kg/d	double	False
UrineSYngTag	Gets the urinary sulphur output per head of unweaned young animals by tag number	kg/d	double	False

Name	Description	Units	Type	Settable?
Weight	Gets the average live weight by group	kg	double	False
WeightAll	Gets the average live weight total	kg	double	False
WeightTag	Gets the average live weight by tag number	kg	double	False
WeightYng	Gets the average live weight of unweaned young animals by group	kg	double	False
WeightYngAll	Gets the average live weight of unweaned young animals total	kg	double	False
WeightYngTag	Gets the average live weight of unweaned young animals by tag number	kg	double	False

Name	Description	Units	Type	Settable?
WtChange	Gets the rate of change of base weight of each animal by group	kg/d	double	False
WtChangeAll	Gets the rate of change of base weight of each animal total	kg/d	double	False
WtChangeTag	Gets the rate of change of base weight of each animal by tag number	kg/d	double	False
WtChangeYng	Gets the rate of change of base weight of unweaned young animals by group	kg/d	double	False
WtChangeYngAll	Gets the rate of change of base weight of unweaned young animals total	kg/d	double	False

Name	Description	Units	Type	Settable?
WtChangeYngTag	Gets the rate of change of base weight of unweaned young animals by tag number	kg/d	double	False

#### Links (Dependencies)

Name	Type	IsOptional?
locWtr	IWeather	False
outputSummary	ISummary	False
paddocks	Zone	False
suppFeed	<a href="#">Supplement</a>	True
systemClock	Clock	False

#### Methods (callable from manager)

Name	Description
Add	<p>void Add(<a href="#">StockAdd</a> animals)</p> <p><i>Causes a set of related age cohorts of animals to enter the simulation. Each age cohort may contain animals that are pregnant and/or lactating, in which case distributions of numbers of foetuses and/or suckling offspring are computed automatically. This event is primarily intended to simplify the initialisation of flocks and herds in simulations.</i></p>
Buy	<p>void Buy(<a href="#">StockBuy</a> stock)</p> <p><i>Buys animals (i.e. they enter the simulation). The purchased animals will form a new animal group that is placed at the end of the list of animal groups.</i></p>

Name	Description
Buy	<p>void Buy(String genotype, double number, ReproductiveType sex, double age, double weight, double fleeceWeight, int32 tag)</p> <p><i>Buys animals (i.e. they enter the simulation). The purchased animals will form a new animal group that is placed at the end of the list of animal groups.</i></p>
ByTag	<p>IEnumerable&lt;AnimalGroup&gt; ByTag(int32 tag)</p> <p><i>Return animal groups that have a specific tag number.</i></p>
Castrate	<p>void Castrate(int32 number, AnimalGroup group)</p> <p><i>Converts ram lambs to wether lambs, or bull calves to steers. If the animal group(s) denoted by group has no suckling young, has no effect. If the number of male lambs or calves in a nominated group is greater than the number to be castrated, the animal group will be split; the sub-group with castrated offspring will remain at the original index and the sub-group with offspring that were not castrated will be added at the end of the set of animal groups.</i></p>
DryOff	<p>void DryOff(int32 number, AnimalGroup group)</p> <p><i>Ends lactation in cows that have already had their calves weaned. The event has no effect on other animals. If the number of cows in a nominated group is greater than the number to be dried off, the animal group will be split; the sub-group that is no longer lactating will remain at the original index and the sub-group that continues lactating will be added at the end of the set of animal groups</i></p>
Join	<p>void Join(String mateTo, int32 mateDays, AnimalGroup group)</p> <p><i>Commences mating of a particular group of animals. If the animals are not empty females, or if they are too young, has no effect</i></p>
Move	<p>void Move(String paddockName, AnimalGroup group)</p> <p><i>Moves animals to a specified paddock.</i></p>
Sell	<p>int32 Sell(int32 number, AnimalGroup group)</p> <p><i>Remove the specified number of animals (not including unweaned lambs/calves).</i></p>
Sell	<p>int32 Sell(int32 number, IEnumerable&lt;AnimalGroup&gt; groups)</p>

Name	Description
Shear	double Shear(boolean shearAdults, boolean shearYoung, <a href="#">AnimalGroup</a> group) <i>Shears sheep. The event has no effect on cattle.</i>
Sort	void Sort()
SplitByAge	IEnumerable< <a href="#">AnimalGroup</a> > SplitByAge(int32 age, <a href="#">AnimalGroup</a> group) <i>Split animal group by age</i>
SplitByWeight	IEnumerable< <a href="#">AnimalGroup</a> > SplitByWeight(double weight, <a href="#">AnimalGroup</a> group) <i>Split animal group by weight</i>
SplitByYoung	IEnumerable< <a href="#">AnimalGroup</a> > SplitByYoung( <a href="#">AnimalGroup</a> group) <i>Split animal group by young.</i>
TramplingMass	double TramplingMass(String paddockName) <i>Get the trampling mass for the specified paddock</i>
Wean	void Wean(int32 number, boolean weanMales, boolean weanFemales, <a href="#">AnimalGroup</a> group) <i>Weans some or all of the lambs or calves from an animal group. The newly weaned animals are added to the end of the list of animal groups, with males and females in separate groups.</i>

## 6 FoodSupplement

Supplement encapsulates the attributes of a single supplement.

### Properties (Outputs)

Name	Description	Units	Type	Settable?
ADIP2CP	Gets or sets the acid detergent insoluble protein:CP.		double	True
AshAlkalinity	Gets or sets the ash alkalinity.	mol/kg	double	True
CrudeProt	Gets or sets the proportion that is crude protein.	0-1.0	double	True

Name	Description	Units	Type	Settable?
DegProt	Gets or sets the protein proportion that is rumen degradable.	0-1.0	double	True
DMDigestibility	Gets or sets the dry matter digestibility.	0-1.0	double	True
DMPropn	Gets or sets the d m_ propn.	0-1.0	double	True
EtherExtract	Gets or sets the ether extractable fraction.	0-1.0	double	True
IsRoughage	Gets or sets a value indicating whether this instance is roughage.	-	boolean	True
Item			double	True
MaxPassage	Gets or sets the maximum proportion passing through the gut (used with whole grains).		double	True
ME2DM	Gets or sets the metabolizable energy:DM (MJ/kg).	0-1.0	double	True
Name	Gets or sets the name of the supplement	-	String	True
Phosphorus	Gets or sets the phosphorus (P:DM).	0-1.0	double	True
Sulphur	Gets or sets the sulphur content (S:DM).	0-1.0	double	True

#### Methods (callable from manager)

Name	Description
AddTranslation	void AddTranslation(String lang, String text) <i>Adds the translation.</i>
Assign	void Assign( <a href="#">FoodSupplement</a> srcSupp) <i>Assigns the specified source supplement.</i>
DefaultADIP2CP	double DefaultADIP2CP()
DefaultDMD	double DefaultDMD()
DefaultFromName	void DefaultFromName()

Name	Description
DefaultME2DM	double DefaultME2DM()
DefaultPhosphorus	double DefaultPhosphorus()
DefaultSulphur	double DefaultSulphur()
IsSameAs	boolean IsSameAs( <a href="#">FoodSupplement</a> otherSupp)  <i>Determines whether [is same as][[the specified other supp].</i>
Mix	void Mix( <a href="#">FoodSupplement</a> supp1, <a href="#">FoodSupplement</a> supp2, double propn1)  <i>Mix two supplements together and store in Self Will work if Supp1=this or Supp2=this This method is only exact if the passage rates of the two supplements are equal</i>
MixMany	void MixMany(List< <a href="#">FoodSupplement</a> > supps, double amounts)  <i>Mixes the many supplements</i>
MixMany	void MixMany(List< <a href="#">SupplementItem</a> > supps)  <i>Mixes the many supplements</i>
ParseText	void ParseText(String suppSt, boolean nameOnly)  <i>The CreateText method is fairly general. The layout of the string is: (Name) [(keyword) (value) (unit)][(keyword)...] If (Name) is found in SuppTokens, then the supplement is initialised to the corresponding supplement. Otherwise it is initialised to supplement number 1 (the first concentrate). Any keywords then modify the composition. Keywords are: DM_PC (%) DMD (%) CP (%) DG (%) ME2DM (MJ) Finally, if only one of DMD and ME2DM was found, the regression equation on ether extract is used to estimate the other.</i>
SetSuppAttrs	void SetSuppAttrs( <a href="#">SuppToStockType</a> value)  <i>Populates fields of this FoodSupplement from a SuppToStockType</i>

## 7 References

M Freer, A.D Moore, J.R Donnelly, 1997. GRAZPLAN: Decision support systems for Australian grazing enterprises—II. The animal biology model for feed intake, production and reproduction and the GrazFeed DSS. *Agricultural Systems* 54 (1), 77 - 126.