

Medieval Agriculture

*Ian Holland,
1999/06/14.
Version 1.11*

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Introduction

Consider a yeoman, Alfred, with 30 acres of crop land to provide him and his family with a living. In many campaigns it is enough just to let this farmer roll once a year to determine how he has done, and how much cash he'll have in his pouch for the following year.

Some players may like to explore the hazards and rewards of living off the land. These rules are for those players and for those players' GM's. In most seasons, our yeoman will make a comfortable, though labour intensive, living. He'll be able to feed himself and his family, pay his rent and have enough cash for his needs.

Not only can these rules be used to calculate the rewards of working farmland, but they can also be used to determine what the rest of the gameworld is doing at any particular time of year. So, even if a player doesn't want to go to the effort to determine the number of chickens his character has, he will be able to know at what time of year it is appropriate to start lopping their heads off.

Adventure hooks can easily be inserted into the agricultural year by the GM letting things "go wrong". What will the players do when their characters have been called up for owed military service just when they need to be ploughing their land? What happens when their livestock goes missing? What do they do in the middle of winter when their food has run out?

Using these rules, a character may find he has little need for money and is quite able to survive, and prosper, with barter.

The effort required to use these rules, even though their implementation is spread over a game year, will tend to restrict their full use to small landholders: serfs, yeoman, petit sergeants and perhaps a Landed Knight. Even so, the GM will be able to use the rules concerned with regional effects to paint a general picture of the campaign world.

Villages

When designing villages, it is best to keep the total amount of arable land less than 1 square mile (640 acres). A value of 600 acres (20 virgates) used for arable land allows the extra 40 acres to be used for dwellings, roads, paths and waste land and have the entire village within 1 square mile. This allows all the fields of the village to be within easy distance.

Villages of this type are suitable for the open field method. If a closed field system is desired, use a value of 450 acres (15 virgates) as the usable maximum. The extra waste is due to the need for extra roads and boundary areas.

Also use the closed field system for any isolated farms that the campaign world may have.

For both systems, the amount of available meadow should also be defined. This is usually equal to one quarter to a half of the area of arable land. It needs to be protected from the livestock, either by fences, walls, hedges, or natural barriers. The meadow is primarily used for hay production. The proportion of meadow that a landholder has access to is proportional to the amount of arable land he has, though there are always exceptions.

Available pasture should also be defined. This is usually less important than the amount of arable land and meadow, but it may become a limiting factor in the number of animals the village can support.

The amount of land set aside for the lord's demesne is another consideration. This is going to be limited by the number of serf households available to work it. A general rule of thumb is to allow three virgates in the demesne for each four virgates assigned to serfs. An effective maximum is one virgate in the demesne for each virgate assigned to serfs. Of course, it is better for the well being of all involved to keep the ratio lower. If a noble (or landed chivalric) character insists, against social convention, on having a greater amount of land in his demesne, he'll most likely find it necessary to pay for the extra labour required to plough his fields and harvest his crops.

Definitions

Bushel

8 gallons of grain/fruit/etc. One bushel of wheat is equivalent to 60 pounds. For convenience, these rules will assume that one bushel of anything is equivalent to 60 pounds.

Yardland or Virgate

A virgate is approximately 30 acres. This value will vary depending on the quality of the soil. That is, farmlands with rich soil will have smaller virgates while those with poor soil will have larger virgates. The usual range of a virgate is from 15 to 40 acres. The real size of each virgate will impact on ploughing and harvesting times, but yields should be pro-rated as if the virgate was exactly 30 acres.

There are two methods of open farming available: the two field system and the three field system. These rules concentrate on the three field system, but a two field system can be used by evenly splitting the available land into two fields. These two fields alternate at being left fallow (not used), while the other field is divided into an autumn and a spring section (not usually equal in size). Each of these sections is then treated as a separate field for the purposes of these rules.

Each year, one field is planted with an autumn crop, another is planted with a spring crop and the third is allowed to lay fallow. A serf will usually own half a virgate, but may have as low as a third or as high as a full virgate. A yeoman will usually own one virgate but may own from half to two virgates. Petit sergeants will have either two or three virgates.

Owed Labour

Serfs owe their lord labour based on the virgate they own. Each virgate owned by a serf owes three days labour a week throughout the year and a full weeks work for each week in September. If a serf owns less than a full virgate (the usual case) then the owed labour is proportional to the land owned. For example, a serf that has half a virgate owes $1\frac{1}{2}$ days per week, while a serf that has a third of a virgate owes 1 day per week. The labour owed in September is unchanged regardless of the amount of land owned.

It should be noted that a serf doesn't actually "own" the land, he merely has the right to use it.

If the campaign is following historical precedents, only six days of each week is available for labour. Also, many agricultural activities are not possible in inclement weather. These two facts conspire to limit the amount of land that is able to be effectively cultivated for a given population.

Rents

Free men (yeomen and petit sergeants) do not owe labour for the lands they hold, but pay rents instead. These rents amount to 12Cr per year per virgate owned. Of course this value will vary from region to region and from manor to manor.

The Farming Year

Season	Month	Miscellaneous Activity	Autumn Field	Spring Field	Fallow Field	
Autumn	September	Accounting, Vat Grapes	Plough (Planting)	Harvest		
	October	Wine Barreled	Planting			
	November	Slaughter	Thresh/Store			
Winter	December	Feasting				
	January				(Plough) (Plough)	
	February	Prune Vineyards	Plough		Plough	
Spring	March				Planting	
	April	Pasture Livestock				
	May	Shear Sheep	Harvest	Weed/Fertilise	(Plough)	
Summer	June	Gather Hay	(Harvest)	Weed/Fertilise	Plough	
	July	(Gather Hay)				
	August	Meadow Livestock	(Harvest)			
		<i>Becomes Spring Field</i>		<i>Becomes Fallow Field</i>	<i>Becomes Autumn Field</i>	

Accounting

This is the time that the manor accounts are settled. It is usually held near the very end of September or very early in October. Historical northwestern Europe used September 29, near the feast of Michaelmas, as their "accounting day". These accounts include the tallying of service owed and payed by each holding, the paying of rents and the balancing of monies owed. The manor court was the scene for many of these transactions.

The rents owed by freemen (yeomen and petit sergeants) were paid in full during this period. It was not required to use coin to pay for these rents: payment in kind was accepted, and in many places such payment became formalised.

If serf holdings are found to have not delivered on all the labour they owed, the serfs are usually fined by their lord, but could be subjected to more severe punishments.

Feasting

Just before winter sets in, the folk of the land stuff themselves silly on the produce of the year. This is the last decent food they are going to have for a long time, and they make the best of it. Choice pigs and sheep and maybe even a cow are sacrificed for the feasting. Loaves made from the best wheat are baked and served with the years best cheese and wine. This is about the only time a lowly peasant gets a glimpse of the good life.

Mind you, if the harvest was poor, all bets are off.

Gather Hay

The previous harvest (May) will have indicated the amount of Fodder available. For each acre of meadow available, that amount (Fodder) of hay may be gathered. It takes 2 man days per acre to gather.

The "(Gather Hay)" entry indicates that this activity can continue if required.

Harvest

Time requirements		
Crop	Equipment	Time Required
Field Crops	1 man, scythe	2 days/acre
Garden Crops	1 man, sickle, digging fork	1 day/croft

Once Field Crops are harvested, they need to be threshed to separate the grain from the rest of the plant. For every bushel of grain gathered, there are four bushels of fodder (straw) obtained.

See **Yield** to determine the success of each harvest.

The "(Harvest)" entries in the table indicate that harvesting may occur if other factors are acceptable. For example, harvesting of the spring crop may begin in August if the crop has ripened, and the weather is acceptable.

Meadow Livestock

At the end of August the meadow is opened to the livestock. Also, this is the time that the number of livestock is recalculated. Most mating seasons occur just before winter and by this time the number of newborn animals that are going to survive can be determined. A check has to be made to ensure that the pasture was able to support the animals kept over the winter.

Multiply the *Fodder (bu/acre)* from the May (spring) harvest (see **Yield**) by the number of pasture acres available to the landholder. This gives the amount of fodder available to the landholders animals. Multiply that value by the nutritional value of pasture fodder (100NU/bu). Next, calculate the total amount of NU's required by the animals by using the values in the *NU per season* column of the **Animal Table**.

If the available NU's from pasture is greater than the animal requirements, all is well. Otherwise, the farmer calculates the percentage of NU available to NU required, and applies that value to each type of animal to determine the survivors. For example: Alfred has 3 cows (10080NU), 6 pigs (12960NU) and 12 chickens (2880NU) for a total pasture requirement of 25920NU. Given that Alfred has access to 15 acres of pasture and the spring harvest resulted a terrible fodder value (12/acre), he has $15 \times 12 \times 100 = 18000$ NU of available pasture. This is $(18000/25920) = 69\%$ of his requirements. Therefore, at this time he has 2.07 cows, 4.14 pigs and 8.28 chickens that survived the season. Use percentile dice to round these fractions to whole numbers.

Of course, if there is other sources of food available, it can be used to supplement the feeding of the animals. Note that any newborns are not taken into account for this purpose. It should also be noted that in normal circumstances there is going to be much more pasture available than needed, so in most cases this step can be safely skipped.

The next step of this phase is to increase the ages of all the surviving animals by one. This is important in determining the next step - births.

To determine the number of new births, make the appropriate rolls on the Reproduction Table. Modify the Crit Die by the autumn harvest's Season Modifier. Each type of animal being bred needs to be checked for using an agricultural skill applicable to the animal. Take the result from the table and multiply it by the number of eligible females of the species. The result is then the number of viable births for that species in this season. If there are any fractions remaining, roll a d10 to determine if an extra birth is made.

The number of eligible females is equal to all the females of the species in the indicated age group. The maximum number of eligible females is equal to the "FM Ratio" multiplied by the number of (viable) males of the species. The number of viable males is also limited by age group.

For example, Harold the serf has 7 pigs, two male and the rest female, all of breeding age. The Season Modifier is +1 and Harold rolls a Success/3 on *Animal Husbandry: Pig Raising*. Given the +1 SM, this results in 2.5×5 , or 12.5 piglets. Harold then rolls an extra d10 (an 8) to determine that he misses out on an extra piglet and settles for 12 new piglets.

The sex of the newborns is determined by using the *%age Male* entry for each species. Multiply the number of newborns by the appropriate value to determine the number of males. Use percentile dice to determine fractions. The remainder are females.

For example, of the 12 new piglets, 25% are male. That is 3 are male and the remaining 9 are female.

Pasture Livestock

Up until this time, and livestock kept over winter has had to be fed from fodder gathered from the previous year. There is now enough vegetation available to be able to turn the animals out onto the pasture.

This is also the time to check how many animals survived the winter. Use the process described in *Meadow Livestock* to determine the number of livestock still alive, except use the *NU per winter* column of the **Animal Table** to determine the amount of NU's required.

Similarly, at the end of this period (late April, immediately before the harvest), if there hasn't been enough food for the people of the holding, the number of survivors needs to be calculated. Be aware that when it becomes obvious that people are going to run out of food, they will most likely attempt to do something about it: like hunting, foraging, theft or buying of supplies. After the number of deaths have been determined, reduce the population accordingly, first by depleting the oldest and then the youngest and then the rest.

Alternatively, the amount of food required (by people and livestock) and that available can be tracked on a monthly basis. If there is a shortfall in food at the end of any month, determine the number of deaths and implement the effects immediately. For realism, the deaths may occur sometime during the next month, rather than being bunched up on the last day of the current month. This will also reflect the fact that man and beast can survive for some time without food.

Planting

There are two planting seasons: the autumn planting and the spring planting. The autumn planting happens in October and consists of wheat and rye. The spring planting has barley and oats and occurs in March. The spring planting is also the time for the crofts to be planted.

Different crops require a differing amount of seed.

Crop	Seed
wheat	1 bu/acre
rye	2 bu/acre
garden	3 bu/croft
barley	2 bu/acre
oats	3 bu/acre

The time required for one man to plant the seed is 1 day per bushel. Five man-days are needed for each croft to be planted. It should be assumed that seed for the croft has been saved from the previous season, or gathered from bought foodstuffs.

The "(Planting)" entry indicates that planting may begin, once the other activities for that month have been completed.

Plough

Before a crop can be planted, the land has to be Ploughed.

The time required to Plough a field is presented in the following table.

Equipment	Time Required
2-8 Oxen, 2 men, Plough	1 day/acre
2-8 Draught Horses, 2 men, Plough	1 day/acre
1 man, hoes/etc	40 days/acre
1 man, hoes/etc	5 days/croft

The variable number of oxen or draught horses is due to the varying quality of land that is to be prepared. The best available land only requires two beasts, while the worst requires a full team of eight. Failure to use the full number of beasts required will cause injury to the animals that are used.

The "(Plough)" entries indicate that ploughing may occur if conditions permit. For example, ploughing may only occur in January if the ground isn't still frozen. While in May, there are more

important activities that must be completed before the ploughing can begin.

Prune Vineyards

This is the time to cut grape vines to encourage grape production. A similar activity is required for any fruit growing acreage. Each acre requires 3 man days to be correctly attended to.

Shear Sheep

Any sheep that have survived over the winter may now be sheared. Twelve (12) sheep can be sheared by one man in a day.

Slaughter

This is the time of year that each holding takes stock of the number of animals it has as well as how many it can afford to feed over the coming four cold months. Those animals that can't be fed as well as those that are needed to feed the holding owners are killed and preserved. Preservation involves either salting the meat, drying it or smoking it.

Salting requires 1 pound of salt for every 4 pounds of flesh to be salted. Time required is 1 man-day per 200 pounds of flesh.

Drying merely requires racks to hold the flesh. Loading the racks takes 1 man-day per 400 pounds of flesh, while the drying process takes an extra two weeks.

Smoking requires smoke houses and wood to fuel them. Preparing the smoke houses takes 1 man-day per 400 pounds of flesh and the smoking process takes half a day.

See the animal table to determine how much flesh each beast will yield. Also, some animals are spared until December to be used in the festivities.

Thresh/Store

Any grain that is to be kept over the winter is stored. This requires the grain to be separated from the stalks (which can then be used as winter fodder). For every bushel of grain threshed, there are four bushels of fodder (straw) obtained.

One man can thresh 20 bushels of grain (and the associated 80 bushels of straw) in a day.

Vat Grapes

There are two activities that may occur during this period. The first is the preparation of grapes for the production of wine, and the second is the preparation of barley for the production of beer. (These rules will use the term "beer", but bear in mind that this also includes "ale", "stout" and, depending on the period of your campaign, "lager".)

Normally, the type of beverage that is likely to be produced is going to be heavily (if not totally) determined by the region that the farm is located. Some regions will be exclusively wine producers, others will only have stout, and yet others have to make do with beer.

Any grapes that are available are harvested at this time. Each acre requires 10 man-days to harvest. The grapes are crushed to produce the grape juice that is used for wine production, with the solid waste being used for "garden" fodder (at 150NU/bu). Depending on locality, this extraction can range from the festive stamping to crushing with close fitting boards in barrels. The average time for crushing is 20bu per day per man.

Any barley that is to be used for beer production needs to be spread out, usually on the floor of specially build barns, to be gently air dried. At the appropriate time the barley grains have malted and are ready to be crushed to extract the malt. The average time to spread the barley is 50bu per day per man. The barley requires approximately 1 week to malt. Of course, the available floor space is going to limit the amount of barley that can be malted. Each bushel of barley requires 10 square feet of floorspace. Therefore, a 15' by 30' barn (the wooden floored loft is usually used) will hold $(15 \times 30)/10 = 45$ bu of barley grain. Note that the same barn can be used four times in the available amount of time.

The quality and quantity of malt that is able to be extracted from the partly germinated barley grains is incorporated into the final Brewing skill check. The Brewing skill is equivalent to the Winemaking skill for DF and attribute bonuses. Unlike the Winemaking skill, the Brewing skill is focused on producing drinkable quantities of beer. Check the Brewing skill for each brewer on the following table.

The amount of barley being used by the brewer must be determined before the roll. The table determines how much usable wort is extracted and fermented into drinkable beer as well as the quality of the finished product.

Brewing Roll	Gallons/Bushel	Quality
Success 10	30	Very Good
Success 8-9	25	Good
Success 3-7	20	Satisfactory
Success 1-2	15	Satisfactory
Failure 9-10	10	Drinkable
Failure 4-8	5	Drinkable
Failure 1-3	0	-

The quality of the wine produced is determined in the **Wine Barreled** step. The quantity of juice extracted is 10 gallons per bushel.

Wine Barreled

After the grape juice has been placed in the vats, it is prepared (adding yeast and other important steps) and left to stand for a month or so. After this time the juice has converted to wine and is placed in barrels. Note that medieval wine was not left to ferment for long. Thus the alcohol content remained low and much of the goodness (and sweetness) of the grapes remained. Of course, some places (mainly monasteries) took the time and effort to make wine that was more than alcoholic grape juice.

Similarly, the beer that has been sitting around in vats is also placed into barrels.

The time for these operations should be approximately 1 day per 50 gallons. This is also the time to make a Winemaking skill check to determine the quality of the wine produced.

Yield

This roll will generate two values: the first is the amount of fodder that each acre of pasture will produce, and the second is the Season Modifier (SM) that is applied to the agricultural rolls that are made at harvest time.

At each harvest (May and August) 1D10 is rolled for each required region. That roll plus the values from the previous two harvests are added together to obtain a value from 3 to 30 that is used as the index on the following table.

Roll	Fodder (bu/acre)	Season Modifier (SM)
3-6	12	-5
7-10	16	-3
11-14	18	-1
15-18	20	0
19-22	21	+1
23-26	22	+3
27-30	24	+5

At harvest time, each character that is growing crops needs to determine how successful the season has been. Roll on the following table for each crop (just once for Garden Crops). The skill used is specific to the crop being determined. For example, use Field Crops for wheat, rye, barley, oats; Garden Crops for garden crops; etc. For each roll, add the Season Modifier (SM) to the Crit Die. For Vine crops, use the Orchard column.

			Harvest Roll					
Success	Failure	Description	Yield					
			Wheat bu/acre	Rye bu/acre	Barley bu/acre	Oats bu/acre	Garden bu/croft	Orchard bu/acre
-4,-3	1-	Disasterous	2	2	2	5	0	0
	2,3	Terrible	4	4	4	6	0	1
	4,5	Awful	5	6	6	7	0	1
	6,7	Very Poor	6	8	8	8	2	2
	-2	Poor	7	10	10	9	4	2
	-1,0	9,10	Below Average	8	12	12	10	6
	1 to 4	11 to 14	Average	8	14	14	11	8
	5	15	Above Average	9	15	15	11	9
	6		Good	10	16	16	12	10
	7		Very Good	12	17	17	12	12
	8		Fine	14	18	18	13	14
	9		Excellent	16	19	19	13	16
	10+		Bountiful	18	20	20	14	20

If a character's crops are part of an open field, then the harvest is going to be influenced by the decisions of all involved. To reflect this, if the character fails the farming roll he adds +2 to the Crit Die. If the roll was successful, he must reduce the Crit Die by 1, to a minimum of 1.

Food Requirements

The following table presents the types of food various animal groups require to feed on. NU requirements for animals are presented in the **Animal Table**. For humans, either use the values from the **GM Handbook** or assume an average of 3000NU per person per year (or 250/person/month), depending on the number of people to be accounted for.

Diet (usual)	
Human	wheat, rye, barley (beer), garden, meat
Horses, Mules, etc [†]	oats, hay, forage
Pig	barley, oats, forage
Sheep	hay, straw, forage
Goats	barley, oats, hay, straw, forage
Chickens	barley, oats, garden, forage
Cattle	hay, straw, forage

[†] Horses require half of their NU intake to be in the form of oats.

Food Value

The following table gives a summary of the uses various products can be put to.

Crop	NU/Bu	Use
Wheat	240	food
Rye	180	food
Barley	180	beer, edible, pigs
Oats	270	horses, pigs, edible
Hay	150	horses, sheep
Straw	90	horses, sheep
Garden Crops	150	food, pigs

Wheat

Wheat is the preferred grain source. Not only does it taste better than the other grains, it will get a good price in the event of a surplus. The flour made from wheat will produce the best bread, but it can also be boiled and eaten as a sort of grainy porridge. The lower down the social structure you are, the more likely that it'll be eaten this way, so as to avoid paying to have it ground into flour.

Rye This grain is famous for the sour rye breads. Unlike wheat, this is the only way it is eaten.

Barley

The primary purpose of growing barley is to make beer. It can also be eaten as a porridge, but that is an experience best left for dire emergencies. The waste from the beer making process, as well as the unprocessed grain can be used as pig food.

Oats As well as food for horses (especially warhorses), this grain can also be had as a porridge, though that tends to be a regional characteristic. Mostly it is reserved as an animal food.

Hay Hay is the dried grass gathered from the meadow. It is essential for the well being of livestock over the winter period, as well as being easily cultivated.

Straw

Straw is the stalks of the grain crops, and is used as bedding as well as a supplement to hay.

Garden Crops

This general category covers various vegetables and legumes which compare poorly to their modern counterparts. They are a welcome addition to an otherwise bland diet, but, due to the cost in labour to produce, are unable to be a major source of sustenance for the average diet.

Animal Table

Animal	Lifespan (yrs)	NU per				FM Ratio	Meat (lbs)	Total NU
		day	month	season	winter			
Calf	(3)	14	420	3360	1680	-	100	400
Cow	20	29	870	6960	3480	20	510	2040
Bull/Ox	20	45	1350	10800	5400	-	1200	4800
Heavy Warhorse	25	50	1500	12000	6000	10	-	-
Medium Warhorse	25	45	1350	10800	5400	10	-	-
Light Warhorse	25	40	1200	9600	4800	10	-	-
Light Arabian	25	36	1080	8640	4320	10	-	-
Light Riding Horse	25	36	1080	8640	4320	10	-	-
Pony	25	33	990	7920	3960	10	-	-
Draught Horse	25	25	750	6000	3000	10	-	-
Mule	15	15	450	3600	1800	-	-	-
Medium Mule	15	20	600	4800	2400	-	-	-
Pig	16	9	270	2160	1080	10	45	180
Ewe	10	8	240	1920	960	20	36	108
Ram	10	9	270	2160	1080	-	54	162
Goat	10	5	150	1200	600	20	18	54
Chicken	5	1	30	240	120	24	3	12

Reproduction Table

Animal	Breeding Age	%age Male	Failure					Success				
			1-	2-3	4-5	6-7	8-9	10+	1-	2-3	4-5	6-7
Horse	2-12	50	0	0	0.1	0.4	0.6	0.8	0.8	0.8	1	1
Cattle	3-15	30	0	0	0.1	0.4	0.6	0.8	0.8	0.8	1	1
Pig	1-4	25	0.2	0.4	0.6	1	1.2	1.5	2	2.2	2.5	3
Sheep	1-7	20	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1	1.2	1.4
Goat	1-6	20	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1	1.2	1.4
Chicken	1-3	5	0.8	1	1.2	1.5	2	2.5	3	3.2	3.4	3.6

Season Modifier Form

Year	Previous							
	May	August	May	August	May	August	May	August
1D10								
SM	—	—						

Crop Form

Crop	Acres	Time (man-days)		Y/acre	Total	Y/acre	Total	Y/acre	Total
		Plough	Plant						

Annual Requirement Form

	Food People	Fodder Cattle, etc	Feed Animals	Keep	Food People	Fodder Cattle, etc	Feed Animals	Keep	Food People	Fodder Cattle, etc	Feed Animals	Keep
Wheat	—	—			—	—			—	—		
Rye	—	—			—	—			—	—		
Barley	—				—				—			
Oats												
Hay	—	—			—	—			—	—		
Straw	—	—			—	—			—	—		
Garden	—				—				—			
Beer/ Wine	—	—			—	—			—	—		
Meat	—	—			—	—			—	—		
Total (NU)												
Required (NU)												

Fodder: For cattle, horses, sheep; Feed: For pigs, chickens, goats

Livestock Form

Animal	Year		CountxAge	Total NU (S/W)	CountxAge	Total NU (S/W)	CountxAge	Total NU (S/W)
	S	W	Sex					
			M					
			F					
			M					
			F					
			M					
			F					
			M					
			F					
			M					
			F					
			M					
			F					
			M					
			F					
			M					
			F					

Monthly Requirement Form