

IN VITRO GAS PRODUCTION OF CALIFORNIA FEEDSTUFFS

Nov-03

(terminology explained at the bottom)

(new samples in *italics*)

	at 6 h	at 24 h	6-24 h	at 72 h	6-72 h	rate %/h
	----- ml of gas/g DM -----					
Alfalfa Hay	107.1	179.9	72.8	198.4	91.3	13.08
	109.2	207.3	98.1	222.3	113.1	11.29
	111.6	211.2	99.6	226.0	114.4	11.34
Mean	109.3	199.4	90.2	215.6	106.3	11.90
Alfalfa Pellets	87.0	189.6	102.5	217.9	130.9	8.50
Alfalfa Silage	70.1	137.4	67.3	162.1	92.0	10.26
	96.6	195.9	99.3	216.1	119.5	9.88
	132.3	203.6	71.4	207.2	75.0	16.91
Mean	99.7	179.0	79.3	195.1	95.5	12.35
Almond Hulls	110.5	227.5	117.0	253.4	142.8	9.58
	124.9	216.9	92.0	225.9	101.0	13.43
	130.7	236.6	105.9	266.8	136.1	12.18
	138.2	252.1	113.9	266.7	128.4	12.22
Mean	126.1	233.3	107.2	253.2	127.1	11.85
CV (%)	9.3	6.4	10.4	7.6	14.4	13.7
Barley Grain	119.7	280.0	160.3	339.9	220.1	7.25
Beet Pulp (dehy)	115.3	274.2	158.8	337.6	222.3	6.96
	129.9	295.2	165.3	349.8	219.9	7.73
	137.6	301.8	164.2	348.7	211.0	8.37
	145.0	315.9	170.9	363.3	218.4	8.47
	148.3	216.3	68.0	218.6	70.3	18.90
	152.2	321.6	169.4	362.8	210.6	9.06
Mean	138.1	287.5	149.4	330.1	192.1	9.92
CV (%)	9.9	13.5	26.9	16.8	31.2	45.0
Bermuda grass	52.0	187.2	135.2	231.4	179.4	6.02
Bermuda (seed scr)	45.8	113.2	67.4	144.8	99.0	6.33
Brewers grains (wet)	95.6	201.6	106.0	227.3	131.6	9.11

	at 6 h	at 24 h	6-24 h	at 72 h	6-72 h	rate	
	ml of gas/g DM					%/h	
Canola Meal	83.9	179.8	96.0	204.6	120.8	8.80	
	86.7	184.4	97.6	208.8	122.0	8.95	
	97.7	189.7	92.0	205.1	107.4	42.69	
	101.0	190.4	89.4	203.9	102.9	11.45	
	107.3	192.5	85.1	202.3	94.9	12.60	
	Mean	95.3	187.4	92.0	204.9	109.6	16.90
CV (%)	10.3	2.8	5.5	1.2	10.6	85.9	
Citrus pulp	224.3	345.5	121.2	351.6	127.3	16.93	
Corn earlage	93.1	302.2	209.1	347.1	254.0	8.41	
Corn Grain	109.3	286.4	177.1	393.7	284.3	5.41	
	111.1	286.1	175.1	384.2	273.1	5.69	
	114.5	295.5	181.0	397.8	283.3	5.67	
	Mean	111.6	289.4	177.7	391.9	280.3	5.59
Corn Hominy	108.0	275.0	167.0	364.1	256.1	5.85	
	116.2	297.4	181.1	396.0	279.8	5.79	
	116.3	289.4	173.1	373.2	256.9	6.20	
	Mean	113.5	287.3	173.8	377.8	264.3	5.95
Corn Silage	71.1	201.6	130.5	268.7	197.6	5.64	
	74.3	193.5	119.2	251.2	176.9	6.31	
	76.6	241.4	164.8	309.1	232.5	5.70	
	77.2	217.5	140.3	275.4	198.2	6.09	
	78.0	204.0	126.0	262.5	184.5	6.34	
	83.3	242.3	159.0	305.1	221.8	6.14	
	84.6	252.4	167.8	302.3	217.7	6.69	
	88.8	220.8	132.0	284.3	195.5	6.24	
	89.3	230.7	141.4	281.3	192.0	7.70	
	92.9	220.3	127.4	270.8	177.9	7.01	
	105.5	261.1	155.6	334.8	229.3	6.31	
	126.2	257.9	131.7	313.6	187.4	8.75	
	Mean	87.3	228.6	141.3	288.3	200.9	6.58
	CV (%)	18.6	10.4	12.2	8.9	10.1	13.1
Cottonseed (fuzzy)	37.3	95.4	58.1	130.6	93.4	5.59	
	46.1	73.5	27.4	106.4	60.3	8.41	
Cottonseed (fuzzy pellet)	37.9	54.6	16.7	85.0	47.1	8.53	
Cottonseed (pima)	23.5	54.4	30.9	65.8	42.3	7.42	

	at 6 h	at 24 h	6-24 h	at 72 h	6-72 h	rate
	----- ml of gas/g DM -----					%/h
Distillers Grains (dehy)	69.0	152.2	83.2	176.6	107.6	8.26
	69.8	168.6	98.8	210.8	141.0	6.82
	71.5	170.5	99.0	210.5	139.0	6.92
	78.3	189.6	111.3	237.7	159.4	6.66
	81.4	177.1	95.6	203.4	121.9	8.52
	85.0	171.9	86.9	189.5	104.5	9.94
	85.5	180.3	94.8	203.1	117.6	9.11
	93.3	199.4	106.2	226.6	133.4	8.84
	94.0	194.3	100.3	216.5	122.5	9.47
	102.5	218.4	115.9	233.4	130.9	8.92
Mean	83.0	182.2	99.2	210.8	127.8	8.35
CV (%)	13.6	10.3	10.2	9.0	12.9	14.0
Joboba Meal	90.6	169.2	78.6	180.4	89.8	11.65
Oat silage	95.9	215.1	119.2	257.6	161.7	8.12
Poultry Waste	24.3	64.3	40.0	89.8	65.5	5.25
Safflower Meal	76.1	143.9	67.8	154.1	77.9	11.36
Soybean Meal	97.3	204.3	107.0	229.6	132.4	9.18
	105.5	223.1	117.6	251.8	146.3	9.06
	Mean	101.4	213.7	112.3	240.7	139.4
Soyhulls	88.4	249.1	160.7	384.4	296.0	4.36
Sudan Grass	65.3	170.5	105.2	233.4	168.1	5.48
Walnut Meal	50.9	100.2	49.4	107.8	56.9	10.62
Wheat Midds	115.9	241.8	125.9	270.7	154.8	9.31
	117.4	235.7	118.4	258.9	141.5	10.07
	118.4	236.8	118.4	260.1	141.6	10.12
	Mean	117.2	238.1	120.9	263.2	146.0
Wheat Silage	82.5	191.2	108.7	230.3	147.7	7.39
	96.9	219.0	122.1	258.4	161.5	7.84
	Mean	89.7	205.1	115.4	244.3	154.6

Terminology

Gas production measures the amount of gas produced by incubation of feed samples with fluid from the rumen of cows in the laboratory. Gas is primarily produced from carbohydrates with little or none arising from fermentation of proteins, fats and ash. Carbohydrates can be classified into those that are structural in nature (i.e., estimated as neutral detergent fiber; NDF) and those that are non-structural in nature (i.e., estimated primarily as sugars, pectins and starches). In general the structural carbohydrates are fermented much more slowly than the non-structural carbohydrates (NSC).

- > Gas produced at 6 h of incubation is a good estimate of the extent of fermentation of NSC
- > Gas produced between 6 & 24 h of incubation is a good estimate of the amount of fermentation of SC that will occur in cows at high feed intake levels (i.e., about 3.5 times maintenance energy intake or about 25 kg/d (55 lb/d) of dry matter intake)
- > Gas produced between 6 & 72 h of incubation is a good estimate of the amount of fermentation of SC that will occur in cows at low feed intake levels (i.e., about 1 times maintenance energy intake or about 7 kg/d (15 lb/d) of dry matter intake)
- > The rate indicates the speed that gas is released throughout the entire 72 h fermentation
- > The CV (co-efficient of variation) is a measure of the variation in the number listed above it

While gas generation profiles can and are used to estimate the energy density of feeds, the purpose of these numbers are to provide relative fermentation rates among and within feeds, particularly at short times of incubation, that reflect short term fermentation potential of feeds in the rumen.