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Grape pomace

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Tables of chemical composition and nutritional value

- Grape pomace, dehydrated
- Grape pulp, dehydrated
- Grape pomace or grape pulp, fresh
- Grape pomace, silage

Avg: average or predicted value; SD: standard deviation; Min: minimum value; Max: maximum value; Nb: number of values (samples) used

Grape pomace, dehydrated

It should contain the seeds, skins and stems.



Crude protein NDF Ether extract Ash Starch Sugars Other

Main analysis	Unit	Avg	SD	Min	Max	Nb
Dry matter	% as fed	91.2	1.9	86.4	96.5	155
Crude protein	% DM	13.6	1.8	8.3	18.6	150
Crude fibre	% DM	24.7	3.6	15.6	34.2	154
Neutral detergent fibre	% DM	60.8	8.2	30.6	75.8	107
Acid detergent fibre	% DM	52.6	7.9	25.7	70.4	106
Lignin	% DM	33.7	6.4	18.3	54.7	114
Ether extract	% DM	6	1.8	2.7	14.2	79
Ash	% DM	7.4	2.9	2.4	17.3	77
Insoluble ash	% DM	1.5	0.4	0.6	2.7	37
Starch (polarimetry)	% DM	1.1		0.6	1.6	2
Starch (enzymatic)	% DM	0.9				
Total sugars	% DM	2.2	5.3	0.01	31.8	101
Gross energy	MJ/kg DM	19.1	1.6	17.3	21.7	11 *

Fatty acids	Unit	Avg	SD	Min	Max	Nb
Myristic acid C14:0	% fatty acids	0.06	0.03	0	0.08	9
Palmitic acid C16:0	% fatty acids	7.1	1	5.5	9.2	17

Palmitoleic acid C16:1	% fatty acids	0.2	0.2	0	0.6	12
Stearic acid C18:0	% fatty acids	4.3	0.8	3.4	5.9	17
Oleic acid C18:1	% fatty acids	16.1	3.6	10.8	24.9	17
Linoleic acid C18:2	% fatty acids	70.9	4.5	60.9	78.2	17
Linolenic acid C18:3	% fatty acids	0.4	0.1	0.2	0.6	17
Minerals						
Calcium	g/kg DM	9.9	4.6	4.1	28.1	137
Phosphorus	g/kg DM	2.7	0.7	1.4	6.5	138
Potassium	g/kg DM	14	5.7	6.4	30.9	98
Sodium	g/kg DM	0.22	0.14	0	0.9	56
Chlorine	g/kg DM	0.5	0.6	0	2.3	31
Magnesium	g/kg DM	0.8	0.1	0.7	1	5
Sulfur	g/kg DM	1.6	0.4	1.1	2.1	5
Manganese	mg/kg DM	13		5	18	4
Zinc	mg/kg DM	25	12	11	43	5
Copper	mg/kg DM	49	22	19	119	65
Iron	mg/kg DM	361		160	645	4
Selenium	mg/kg DM	0.2		0.1	0.2	2
Pig nutritive values						
Energy digestibility, growing pig	%	46.8				*
DE growing pig	MJ/kg DM	8.9				*
ME _n growing pig	MJ/kg DM	8.3				*
NE growing pig	MJ/kg DM	5.2				*
Nitrogen digestibility, growing pig	%	47.6				*
Poultry nutritive values						
AME _n cockerel	MJ/kg DM	5.2				*
AME _n broiler	MJ/kg DM	4.9				*
Ruminants nutritive values						
OM digestibility, ruminants	%	38.1				*
Energy digestibility, ruminants	%	36				*
ME ruminants	MJ/kg DM	5.5				*
Nitrogen digestibility, ruminants	%	52.3				*
Nitrogen degradability (effective, k=6%)	%	21	9	9	32	7 *
Nitrogen degradability (effective, k=4%)	%	23		11	23	3 *
a (N)	%	16				1
b (N)	%	12				1
c (N)	h-1	0.057				1
Dry matter degradability (effective, k=6%)	%	26		15	41	4 *
Dry matter degradability (effective, k=4%)	%	29		16	30	2 *
a (DM)	%	10				1
b (DM)	%	35				1
c (DM)	h-1	0.05				1
Rabbit nutritive values						
DE rabbit	MJ/kg DM	6.8				*
ME _n rabbit	MJ/kg DM	6.6				*
Energy digestibility, rabbit	%	35.6				1 *
Nitrogen digestibility, rabbit	%	16.3				*

The asterisk * indicates that the average value was obtained by an equation.

References

Abarghie et al., 2015; AFZ, 2017; Alibes et al., 1990; Bahrami et al., 2010; Basalan et al., 2011; Baumgärtel et al., 2007; Bruttini, 1923; Chapoutot et al., 1990; Fegeros et al., 1987; Fernandez Carmona et al., 1996; Goñi et al., 2007; Guemour et al., 2010; Hadjipanayiotou et al., 1976; Kandylis et al., 1986; Krishna, 1985; Krishna, 1985; Maertens et al., 2001; Moate et al., 2014; Molina-Alcaide et al., 2008; Morgan et al., 1980; Orskov et al., 1992; Parigi-Bini et al., 1980; Sarcicek et al., 2002; Tsiplakou et al., 2008; Winkler et al., 2015; Wolter et al., 1979; Zalikarenab et al., 2007

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Grape pulp, dehydrated

Grape pulp should be free of seeds.



Main analysis	Unit	Avg	SD	Min	Max	Nb
Dry matter	% as fed	90.1	2.2	79.2	96.7	50
Crude protein	% DM	13.4	1.3	11	18.3	35
Crude fibre	% DM	20.7	3.5	16.9	32	43
Neutral detergent fibre	% DM	51.4	7.5	22.2	66.6	35
Acid detergent fibre	% DM	43.6	8.6	20.4	62.8	35
Lignin	% DM	28.3	8.5	10.8	46.8	47
Ether extract	% DM	5.4	1.3	3.9	10.6	35
Ash	% DM	8.3	1.9	5.8	13.3	30
Insoluble ash	% DM	1.7				
Starch (polarimetry)	% DM	1.1				
Starch (enzymatic)	% DM	0.9				
Total sugars	% DM	10.3	4.9	3.2	16.1	11
Gross energy	MJ/kg DM	18.6				*

Amino acids	Unit	Avg	SD	Min	Max	Nb
Alanine	g/16g N	4.4				*
Arginine	g/16g N	5.2				*
Aspartic acid	g/16g N	5.1				*
Cystine	g/16g N	1.2		1.2	1.2	2
Glutamic acid	g/16g N	15.7				*
Glycine	g/16g N	6.4				*
Histidine	g/16g N	2				*
Isoleucine	g/16g N	3.6				*
Leucine	g/16g N	6.5				*
Lysine	g/16g N	3.9				*
Methionine	g/16g N	1.1		0.8	1.5	2
Methionine+cystine	g/16g N	2.2		2	2.7	2
Phenylalanine	g/16g N	3.4				*
Phenylalanine+tyrosine	g/16g N	5.4				*
Proline	g/16g N	3.6				*
Serine	g/16g N	3.6				*
Threonine	g/16g N	3.5		3.4	3.8	2
Tryptophan	g/16g N	1				*
Tyrosine	g/16g N	2				*
Valine	g/16g N	3.8				*

Fatty acids	Unit	Avg	SD	Min	Max	Nb
Myristic acid C14:0	% fatty acids	0.06	0.03	0	0.08	9
Palmitic acid C16:0	% fatty acids	7.1	1	5.5	9.2	17
Palmitoleic acid C16:1	% fatty acids	0.2	0.2	0	0.6	12
Stearic acid C18:0	% fatty acids	4.3	0.8	3.4	5.9	17
Oleic acid C18:1	% fatty acids	16.1	3.6	10.8	24.9	17
Linoleic acid C18:2	% fatty acids	70.9	4.5	60.9	78.2	17
Linolenic acid C18:3	% fatty acids	0.4	0.1	0.2	0.6	17

Minerals	Unit	Avg	SD	Min	Max	Nb
Calcium	g/kg DM	11.1	6.1	6	24.2	9
Phosphorus	g/kg DM	3	0.4	2	3.3	9
Potassium	g/kg DM	23		22	23.4	4
Sodium	g/kg DM	0.23	0.07	0.17	0.35	6
Chlorine	g/kg DM	0.5				
Magnesium	g/kg DM	0.8				
Sulfur	g/kg DM	1.6				
Manganese	mg/kg DM	13				
Zinc	mg/kg DM	25				
Copper	mg/kg DM	29	14	16	62	14
Iron	mg/kg DM	361				
Selenium	mg/kg DM	0.2				

Pig nutritive values	Unit	Avg	SD	Min	Max	Nb
Energy digestibility, growing pig	%	53.2				*
DE growing pig	MJ/kg DM	9.9				*
MEn growing pig	MJ/kg DM	9.3				*
NE growing pig	MJ/kg DM	5.9				*
Nitrogen digestibility, growing pig	%	50.4				*

Poultry nutritive values	Unit	Avg	SD	Min	Max	Nb

AMEn cockerel	MJ/kg DM	5.6	*			
AMEn broiler	MJ/kg DM	5.4	*			
Ruminants nutritive values	Unit	Avg	SD	Min	Max	Nb
OM digestibility, ruminants	%	41			1	*
Energy digestibility, ruminants	%	38.3				*
ME ruminants	MJ/kg DM	5.8				*
Nitrogen digestibility, ruminants	%	51.8			1	*
Nitrogen degradability (effective, k=6%)	%	21				*
Nitrogen degradability (effective, k=4%)	%	23				*
a (N)	%	16			1	
b (N)	%	12			1	
c (N)	h-1	0.057			1	
Dry matter degradability (effective, k=6%)	%	26				*
Dry matter degradability (effective, k=4%)	%	29				*
a (DM)	%	10			1	
b (DM)	%	35			1	
c (DM)	h-1	0.05			1	
Rabbit nutritive values	Unit	Avg	SD	Min	Max	Nb
DE rabbit	MJ/kg DM	7.9				*
ME _n rabbit	MJ/kg DM	7.7				*
Energy digestibility, rabbit	%	42.7				*
Nitrogen digestibility, rabbit	%	22.6				*

The asterisk * indicates that the average value was obtained by an equation.

References

AFZ, 2017; Maymone et al., 1945; Mollaei et al., 2015; Regadas Filho et al., 2011; Vargas et al., 1965

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Grape pomace or grape pulp, fresh

All types included: with or without stems, with or without seeds, from wineries, distillation or juice production



Main analysis	Unit	Avg	SD	Min	Max	Nb
Dry matter	% as fed	39.7	8.4	27.3	59.5	26
Crude protein	% DM	11.8	2.2	8.3	16.4	26
Crude fibre	% DM	25.7	5.3	15.8	36.5	21
Neutral detergent fibre	% DM	53.8	14.7	30.6	73	9
Acid detergent fibre	% DM	44.1	12.9	25.7	65	9
Lignin	% DM	34.7	10.4	20.2	50.4	6
Ether extract	% DM	5.8	2.4	2.7	10.1	20
Ash	% DM	8.4	3.6	4.7	17.3	26
Insoluble ash	% DM	0.6			1	
Starch (polarimetry)	% DM	1.6			1	
Total sugars	% DM	18.5	11.5	3.9	31.8	7
Gross energy	MJ/kg DM	18.8	1.6	17.3	20.8	5 *
Amino acids	Unit	Avg	SD	Min	Max	Nb
Alanine	g/16g N	4.4				*
Arginine	g/16g N	5.2				*
Aspartic acid	g/16g N	5.1				*
Cystine	g/16g N	1.2				*
Glutamic acid	g/16g N	15.7				*
Glycine	g/16g N	6.4				*
Histidine	g/16g N	2				*
Isoleucine	g/16g N	3.6				*
Leucine	g/16g N	6.5				*
Lysine	g/16g N	3.9				*
Methionine	g/16g N	1.1				*
Methionine+cystine	g/16g N	2.2				*
Phenylalanine	g/16g N	3.4				*
Phenylalanine+tyrosine	g/16g N	5.4				*
Proline	g/16g N	3.6				*
Serine	g/16g N	3.6				*

Threonine	g/16g N	3.5	*
Tryptophan	g/16g N	1	*
Tyrosine	g/16g N	2	*
Valine	g/16g N	3.8	*

Fatty acids	Unit	Avg	SD	Min	Max	Nb
Myristic acid C14:0	% fatty acids	0.06	0.03	0	0.08	9
Palmitic acid C16:0	% fatty acids	7.1	1	5.5	9.2	17
Palmitoleic acid C16:1	% fatty acids	0.2	0.2	0	0.6	12
Stearic acid C18:0	% fatty acids	4.3	0.8	3.4	5.9	17
Oleic acid C18:1	% fatty acids	16.1	3.6	10.8	24.9	17
Linoleic acid C18:2	% fatty acids	70.9	4.5	60.9	78.2	17
Linolenic acid C18:3	% fatty acids	0.4	0.1	0.2	0.6	17

Minerals	Unit	Avg	SD	Min	Max	Nb
Calcium	g/kg DM	7.2	1.9	4.7	9.2	5
Phosphorus	g/kg DM	2.5	0.4	2	3	5
Copper	mg/kg DM	78				1

Pig nutritive values	Unit	Avg	SD	Min	Max	Nb
Energy digestibility, growing pig	%	50.8				*
DE growing pig	MJ/kg DM	9.5				*
ME _n growing pig	MJ/kg DM	9.1				*
NE growing pig	MJ/kg DM	5.8				*
Nitrogen digestibility, growing pig	%	42.2				*

Poultry nutritive values	Unit	Avg	SD	Min	Max	Nb
AME _n cockerel	MJ/kg DM	6.6				*
AME _n broiler	MJ/kg DM	6.4				*

Ruminants nutritive values	Unit	Avg	SD	Min	Max	Nb
OM digestibility, ruminants	%	37.3	8.9	14	56	13 *
Energy digestibility, ruminants	%	34.6		31.3	48.7	2 *
ME ruminants	MJ/kg DM	5.3				*
Nitrogen digestibility, ruminants	%	45.2				*
Nitrogen degradability (effective, k=6%)	%	21				*
Nitrogen degradability (effective, k=4%)	%	23				*
a (N)	%	16				
b (N)	%	12				
c (N)	h-1	0.057		0.037	0.076	3
Dry matter degradability (effective, k=6%)	%	26				*
Dry matter degradability (effective, k=4%)	%	29		28	34	3 *
a (DM)	%	10				
b (DM)	%	35				
c (DM)	h-1	0.05		0.029	0.075	3

Rabbit nutritive values	Unit	Avg	SD	Min	Max	Nb
DE rabbit	MJ/kg DM	7.6				*
ME _n rabbit	MJ/kg DM	7.5				*
Energy digestibility, rabbit	%	40.3				*
Nitrogen digestibility, rabbit	%	11.1				*

The asterisk * indicates that the average value was obtained by an equation.

References

AFZ, 2017; Alibes et al., 1990; Basalan et al., 2011; Baumgärtel et al., 2007; Maymone et al., 1945; Molina-Alcaide et al., 2008; Tisserand et al., 1989; Winkler et al., 2015

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Grape pomace, silage

All types included: with or without stems, with or without seeds, from wineries, distillation or juice production



Main analysis	Unit	Avg	SD	Min	Max	Nb
Dry matter	% as fed	37.0	7.6	29.5	47.1	5
Crude protein	% DM	12.9	1.1	10.9	14.2	7

Crude fibre	% DM	27.7	2.6	24.2	29.9	6
NDF	% DM	54.2	14.4	40.1	68.9	3
ADF	% DM	53.3	8.7	44.8	62.1	3
Lignin	% DM	36.2		30.1	42.2	2
Ether extract	% DM	6.8	4.3	2.0	12.6	5
Ash	% DM	7.1	1.3	5.6	8.8	6
Starch (polarimetry)	% DM	0.3				1
Gross energy	MJ/kg DM	19.4				*
Minerals	Unit	Avg	SD	Min	Max	Nb
Calcium	g/kg DM	6.1				1
Potassium	g/kg DM	19.4				1
Sodium	g/kg DM	0.2				1
Magnesium	g/kg DM	1.2				1
Copper	mg/kg DM	34				1
Secondary metabolites	Unit	Avg	SD	Min	Max	Nb
Tannins (eq. tannic acid)	g/kg DM	36.0				1
Tannins, condensed (eq. catechin)	g/kg DM	8.1				1
Ruminant nutritive values	Unit	Avg	SD	Min	Max	Nb
OM digestibility, ruminants	%	25.5	7.0	14.0	32.5	5
Energy digestibility, ruminants	%	23.4				*
DE ruminants	MJ/kg DM	4.5				*
ME ruminants	MJ/kg DM	3.7				*
Nitrogen digestibility, ruminants	%	42.1	7.4	2.0	42.1	4 *

The asterisk * indicates that the average value was obtained by an equation.

References

Alibes et al., 1990; Larwence et al., 1983; Moate et al., 2014; Reyne et al., 1977; Winkler et al., 2015

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