

Abstract: The primary objectives of this study was to evaluate quality of wood pellets which was produced in 5 provinces across Canada, by 8 major pellet producers. Quality was evaluated according to PFI and EN-14961-2 standards. All test were provided in accordance with ASTM standards. Almost all samples match EU and American standards with minor expectations.

Introduction

- Canada is one of the leading countries in wood pellet production
 - There are 39 operational pellet plants in Canada[1]
 - Installed capacity in 2011 was 3.22 mil. tones[1]
 - Export is around 90% (mainly to EU)[2,3]
 - **No national standard for wood pellets**
- ### Materials
- 8 different pellet producers
 - 5 Canadian provinces (ON, MB, BC, NS, QC)
 - 9 parameters were tested
 - Pellet Fuel Institute(PFI standard) and EN 14961-2 (pan-European standard)



source: www.piczbox.biz

Methods

- Bulk density measured according to ASTM E 873-82.
- Durability and fines amount according CEN/TS 15210-1.
- Moisture content according ASTM E 871-82
- Proximate analysis was provided according to ASTM 870-06
- Calorific value according ASTM E711-87
- Single pellet density defined using the hydrostatic method

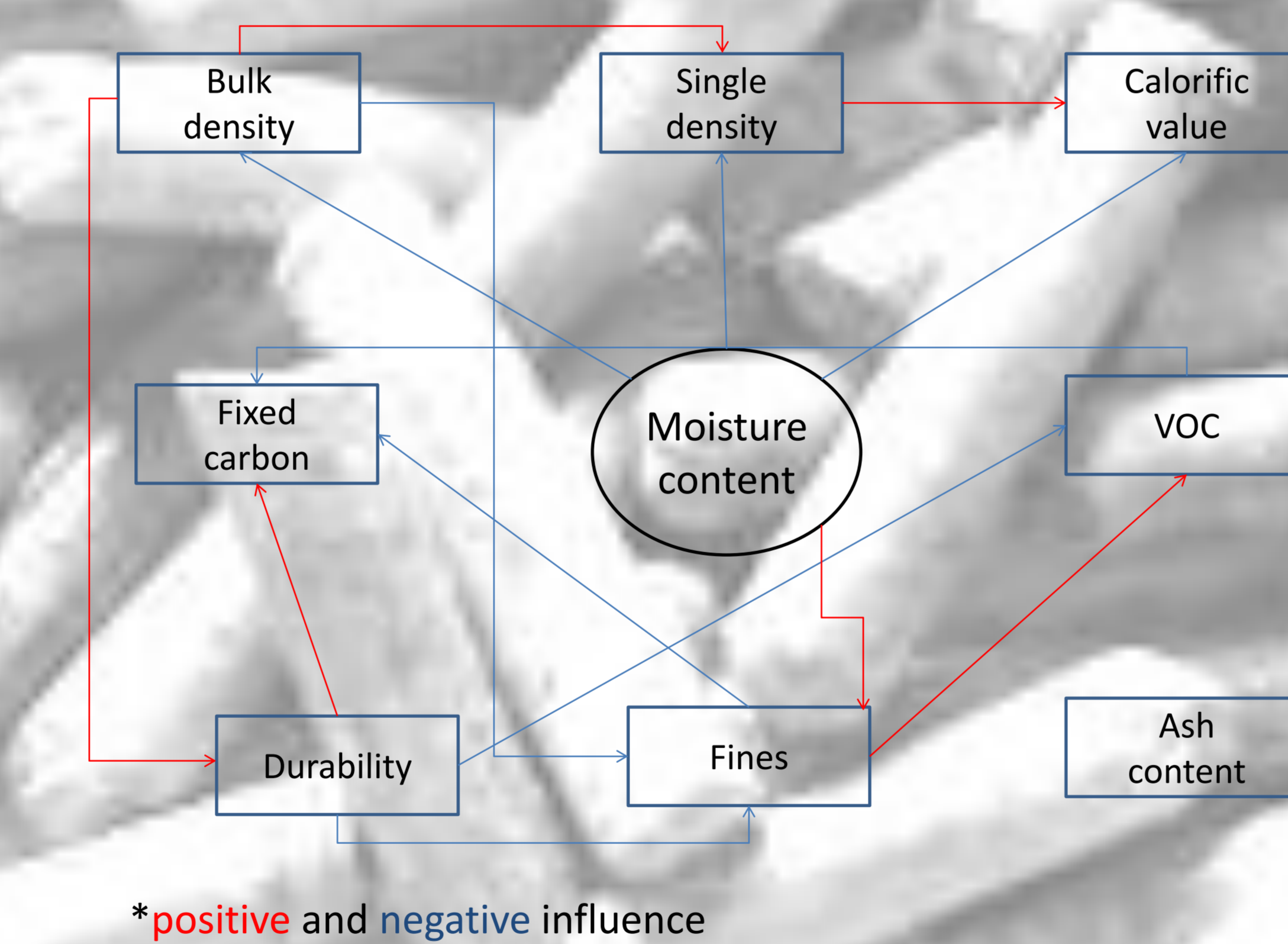
Results

No	Bulk density (kg/m³)	MC (%)	Durability (%)	Fines (%)	Single density (kg/m³)	Calorific value (MJ/kg)	VOC (%)	Fixed Carbon (%)	Ash (%)
1	701.3	4.44	97.6648	0.0635	1249.884	20.5425	84.995	14.55	0.4568
2	665.3	6.08	99.1020	0.0761	1240.451	19.6259	83.845	15.625	0.52785
3	634.6	5.51	92.3893	0.3771	1255.368	19.8387	86.85	12.77	0.38415
4	693.6	4.78	98.2378	0.0955	1292.644	20.2576	85.4	14.25	0.35905
5	696.8	3.76	97.0687	0.0849	1298.869	20.6473	84.43	15.135	0.29515
6	716.3	4.06	98.0386	0.0957	1265.697	20.2573	85.41	14.28	0.3084
7	683.6	4.83	98.8693	0.0421	1234.577	20.4172	85.595	13.355	1.0515
8	710.3	4.61	99.2355	0.0621	1235.499	19.4245	83.955	15.5	0.5379

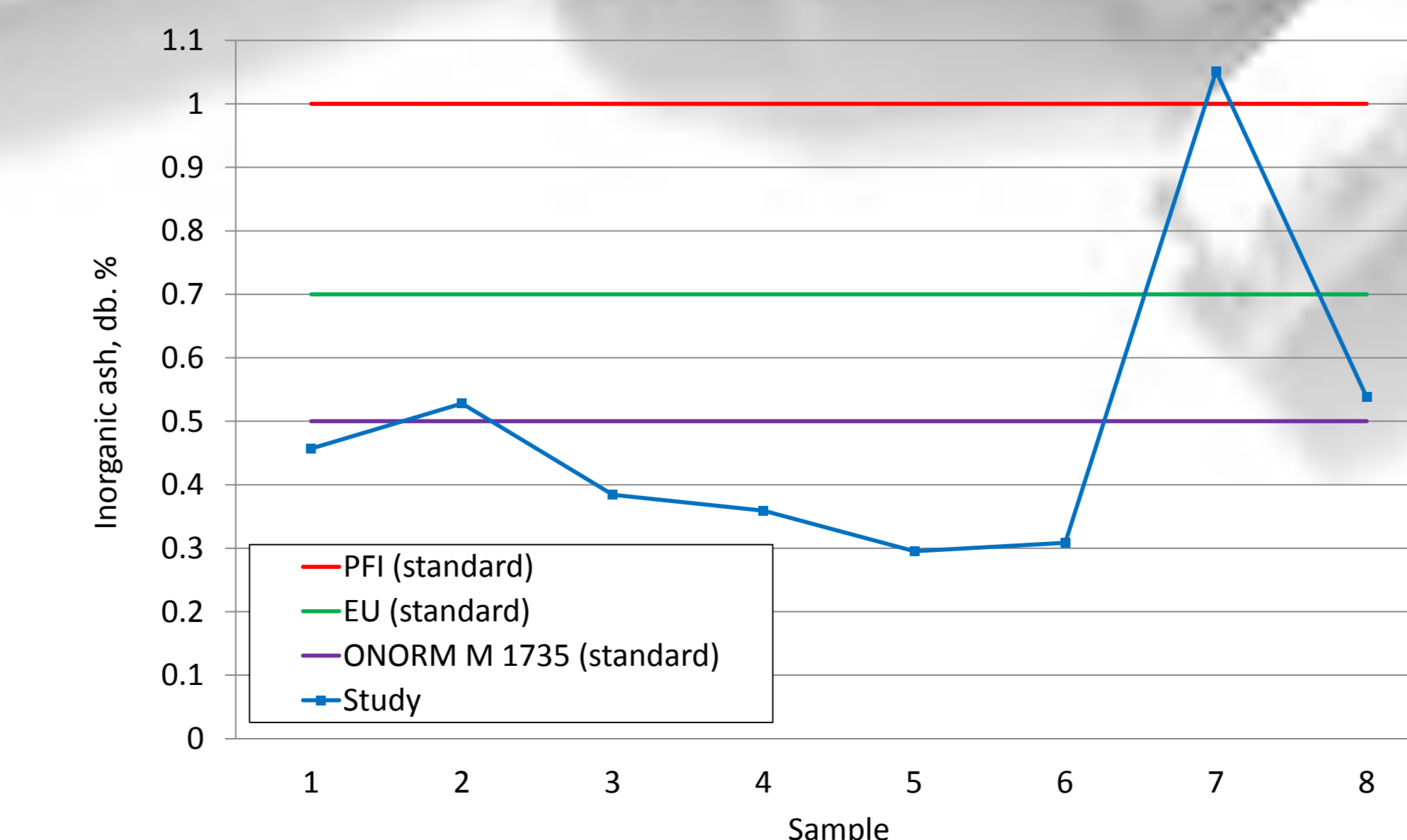
Correlation dependence

	Bulk density	MC	Durability	Fines	Single density	CV	VOC	Fixed carbon	Ash content
Bulk	1	-0.76161	0.692765	-0.76921	0.173293	0.293061	-0.48646	0.495041	-0.10159
MC	-0.76161	1	-0.15888	0.363181	-0.50703	-0.63799	0.067913	-0.10324	0.259786
Durability	0.692765	-0.15888	1	-0.95409	-0.19514	-0.02023	-0.7537	0.658643	0.351286
Fines	-0.76921	0.363181	-0.95409	1	0.067556	-0.24272	0.72561	-0.63003	-0.31737
Single density	0.173293	-0.50703	-0.19514	0.067556	1	0.539777	0.105519	0.028094	-0.66086
CV	0.293061	-0.63799	-0.02023	-0.24272	0.539777	1	0.246584	-0.25885	-0.01978
VOC	-0.48646	0.067913	-0.7537	0.72561	0.105519	0.246584	1	-0.97243	0.017046
Fixed carbon	0.495041	-0.10324	0.658643	-0.63003	0.028094	-0.25885	-0.97243	1	-0.24539
Ash content	-0.10159	0.259786	0.351286	-0.31737	-0.66086	-0.01978	0.017046	-0.24539	1

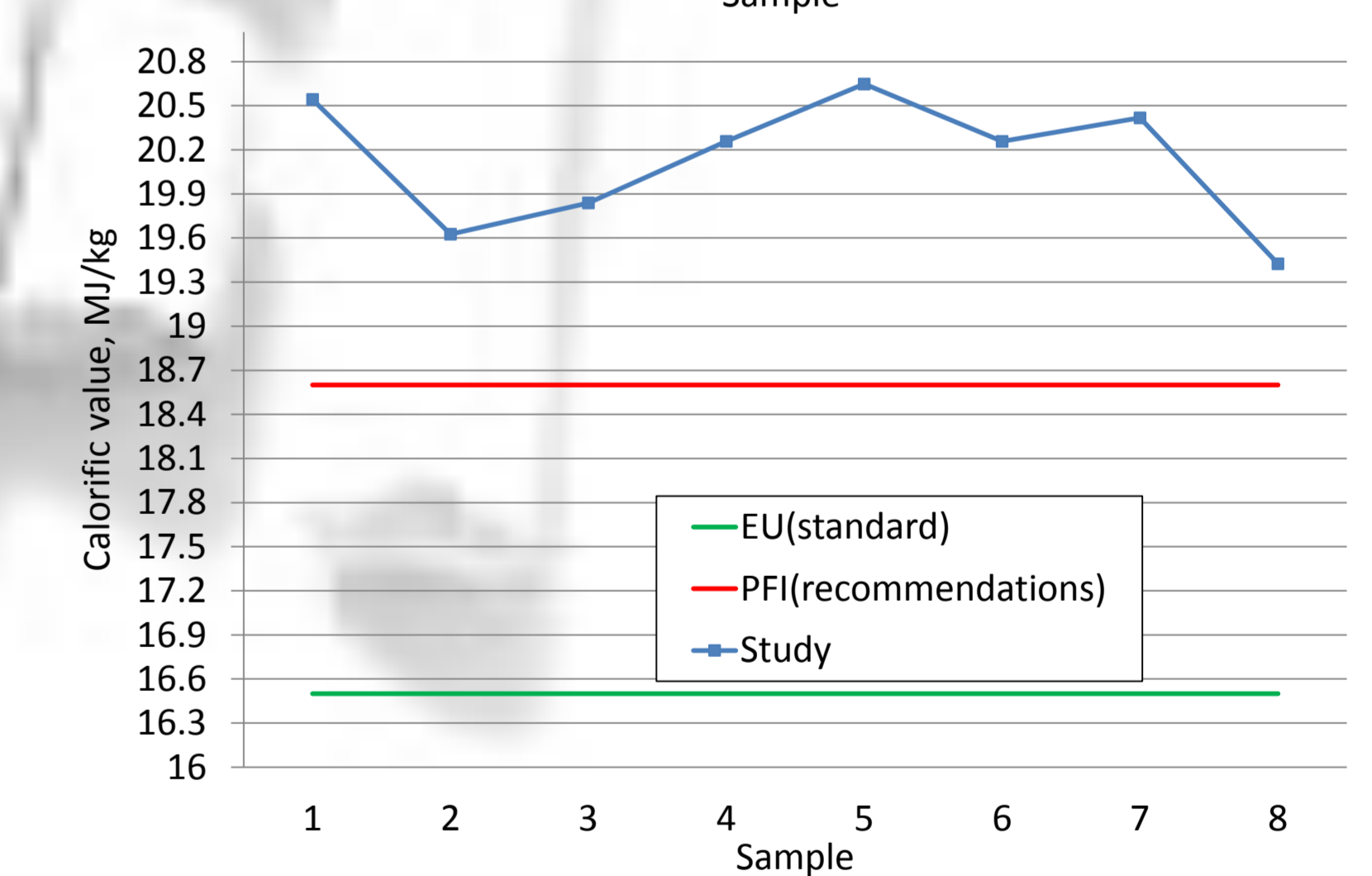
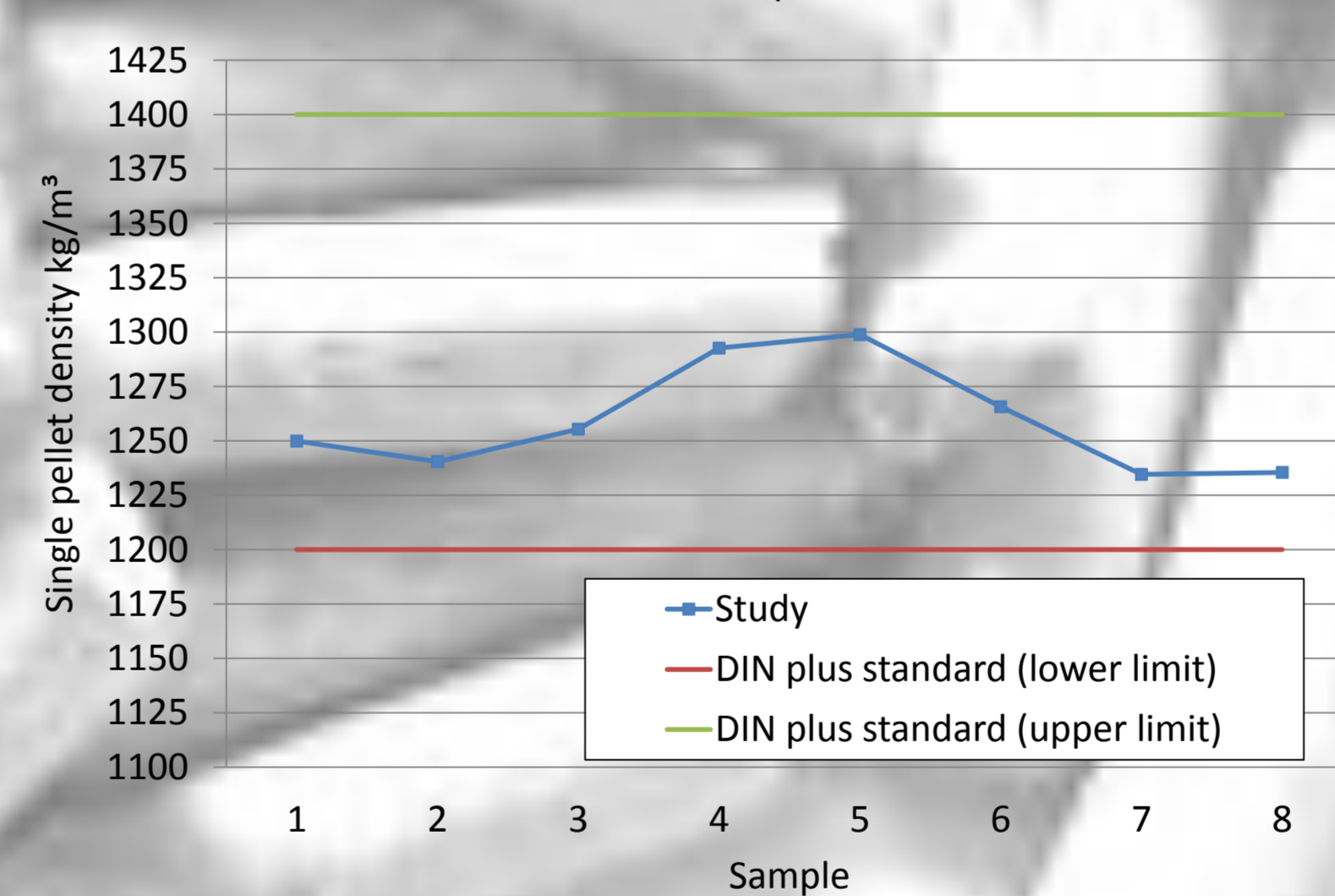
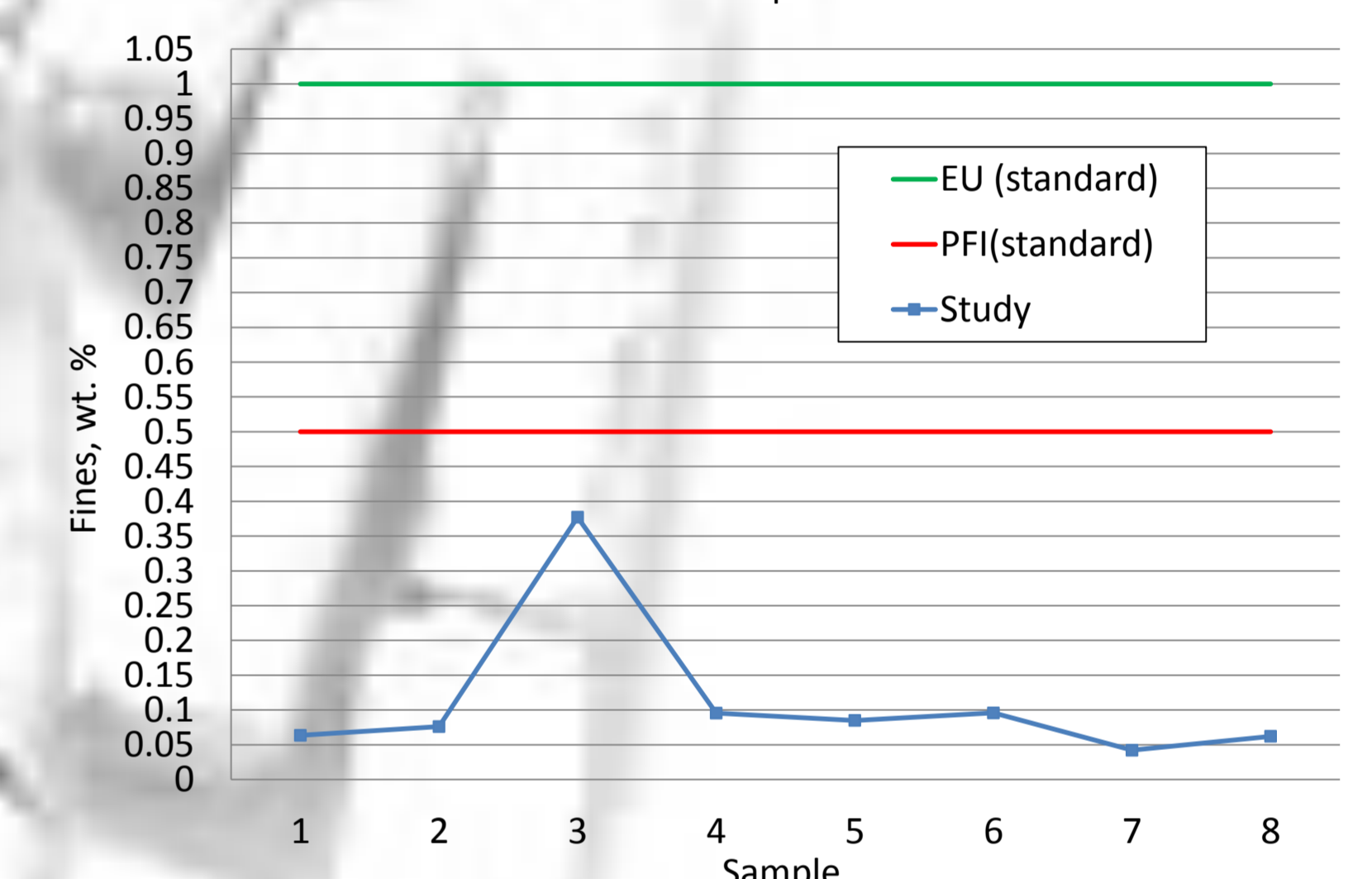
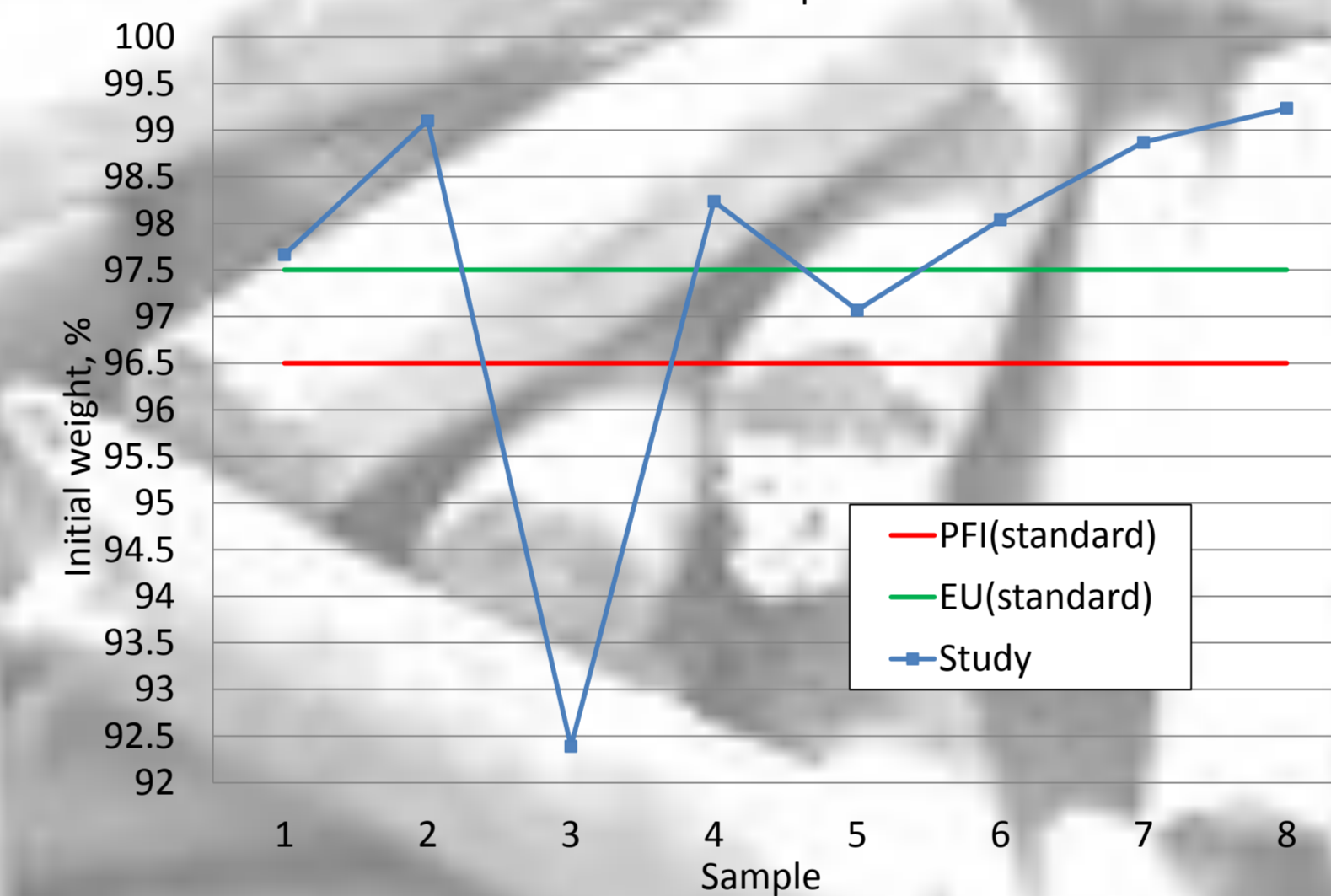
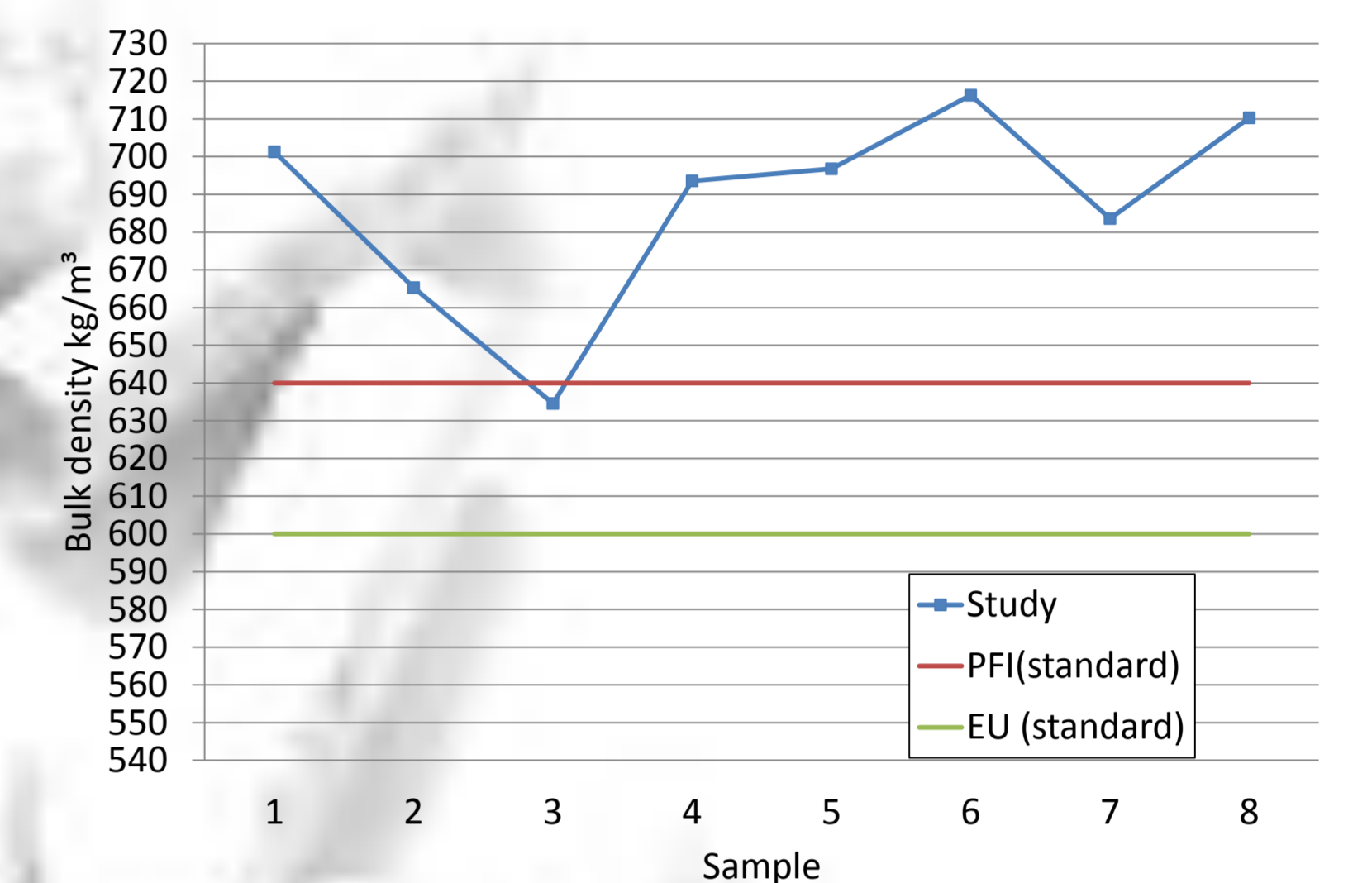
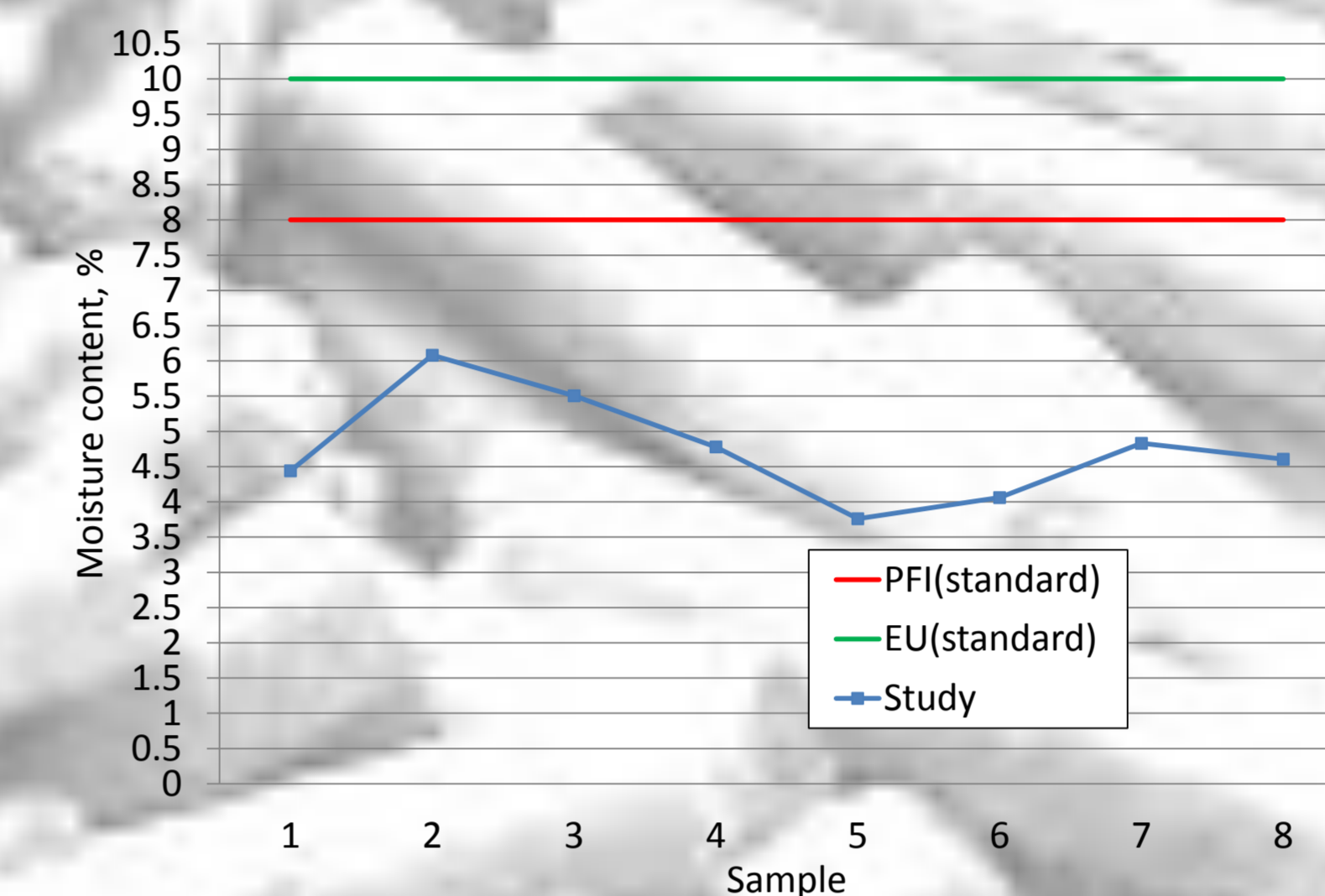
Parameters interdependence



Results and discussion



Results and discussion



Conclusion

- ✓ Average values of all parameters match European and American standards
- ✓ Strong positive correlation of VOC with fines amount
- ✓ Fixed carbon is acting as an adhesive
- ✓ Two samples doesn't match the EU-standard standard by durability
- ✓ One sample doesn't match both standards by ash content.

background source: southeastwoodpellets.co.uk

1. UNECE/FAO Forest Products Annual Market Review, 2011-2012, p.10-0
2. Jamieson S. One home at time", Canadian Biomass Journal, Y2010, March-April
3. Eurostat European Statistics <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/>