WORKING DOCUMENT

JUNE 2023

PIG CARCASS CLASSIFICATION IN BELGIUM

PART II OF THE PROTOCOL

provided for in part B of Annex V to the Commission Delegated Regulation (EU) 2017/1182 of 20 April 2017 supplementing Regulation (EU) No 1308/2013 of the European Parliament and of the Council as regards the Union scales for the classification of beef, pig and sheep carcasses and as regards the reporting of market prices of certain categories of carcasses and live animals

Submitted by the Belgian authorities with a view to update / approve the following grading methods:

- **AutoFOM III** (measuring principle: ultrasound reflection, non-invasive)
- **AutoFOM IV** (measuring principle: ultrasound reflection, non-invasive)
- **FOM II** (Fat-O-Meat'er II) (measuring principle: light reflection, invasive)
- **OptiGrade-MCP** (measuring principle: light reflection, invasive)
- **CSB Image-Meater 2.0** (measuring principle: image analysis, non-invasive)
- **CSB Image-Meater 4.0** (measuring principle: image analysis, non-invasive)
- **OptiScan-TP** (measuring principle: "Zwei-Punkte Messverfahren (ZP)", non-invasive)
- **OptiScan-TPC** (measuring principle: "Zwei-Punkte Messverfahren (ZP)", non-invasive)
- **ZP (ruler)** (measuring principle: "Zwei-Punkte Messverfahren (ZP)", non-invasive)

An application for updating of the lean meat assessment formulae for AutoFom III, FOM II and OptiScan-TP and for approval of the lean meat assessment formulae for AutoFom IV, CSB Image-Meater 2.0 and 4.0, OptiGrade-MCP, OptiScan-TPC and manual ZP to be used for grading pig carcasses in Belgium in accordance with the EU reference dissection method

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1 INTRODUCTION

Since 2002, classification of pig carcasses belongs to the competencies of the regional authorities in Belgium (Flemish Region, Walloon Region and Brussels Capital Region). When not automated, the classification is done by slaughterhouse personnel licensed by the regional ministries authorized for agriculture. Depending on the region control is organized by the authorized ministries and/or an independent organ: the “Cellule Wallonne de Contrôle du Classement des carcasses” (CW3C).

Belgium started classification of pig carcasses according to Commission Regulation (EEC) 3220/84 in 1989 using the SKGII apparatus both for lean meat content ((EEC) 184/88 as amended by (EEC) 703/93) and conformation determination. Since July of 1999 grading of pig carcasses was carried out with light reflectance probes (CGM or PG200) ((EEC) 107/97 as amended by (EEC) 734/97). Since November 1999, determination of the conformation (type) of pig carcasses is no longer obligatory, but if a slaughterhouse wants to determine the conformation, this has to be done using a camera system (VCS 2000 or PIC 2000). In 2006 – 2007 the classification devices VCS 2000, HGP4 and OptiScan-TP were tested in Belgium and their use was granted as of 2008 ((EEC) 2008/176).

In 2012 two authorisation tests were organized in order to recalibrate the devices in use (CGM, PG200, HGP4, VCS 2000 and OptiScan-TP) and test new devices (AutoFom III, FOM II and CSB Image-Meater). So, eight devices are approved to be used in Belgium (2012/416/EU). Since, the legislation in the Flemish Region has limited the validity of the prediction equations of the pig carcass classification devices used in the Flemish slaughterhouses. By the end of 2023 the actual prediction formulae will no longer be valid. The aim is to avoid prediction equations being used forever and stimulate adaptation of the prediction equations regularly to changes in pig population, modifications in the EU Regulation definition of lean meat content, …

Hence, a new authorisation test was carried oud, with nine classification apparatuses: AutoFOM III, AutoFOM IV, FOM II, Optigrade-MCP, CSB Image-Meater 2.0, CSB Image-Meater 4.0, OptiScan-TP, OptiScan-TPC and ZP (ruler). Based on the documentation below, we wish to apply for approval for grading pig carcasses in Belgium using these apparatuses.

2 MATERIAL AND METHODS

2.1 Carcass selection

The calibration trial was carried out during the period 6/03/2023 to 17/03/2023 in slaughterhouse Westvlees NV. AutoFOM III and IV were installed in series inline, from which the former was providing the selection parameters R2P10 and R3P5 used for carcass selection during the trial. After carcass splitting, carcasses fitting the selection scheme were directed towards a parallel line and there measured by the other devices. The subsequent day, the left halves of the carcass were CT scanned. A total of 168 carcasses was scanned, from which 4 carcasses were removed because of possible synchronization errors, to end up with a final selection of 164. Additionally, 17 out of these 164 underwent a total manual dissection. In the Table 1, the selection grid according to AutoFOM III parameters R2P10 and R3P5 can be found, as well as the distribution according to the sex. In Table 2, the mean hot carcass weight (HCW) of the sample can be found. To reduce the impact of certain genetics, the carcasses were selected from as much different farms as possible. The final 164 pigs did come from 87 different farms, with a maximum of 5 pigs per farm, except for one (9 pigs)

because of the variety of genetics and conformation traits of the delivered pigs. The list of 164 carcasses with selection parameters can be found in Annex I.

Table 1: The distribution of carcasses according to the selection parameters

	Group 1	Group 2	Group 3	Group 4	Total
R2P10	< 5.96	5.96 – 7.62	7.63 – 9.77	> 9.77	
Scanning	41 (40)*	42 (40)	40 (40)	41 (40)	164
Dissection	4 (4)	4 (4)	4 (4)	5 (4)	17

	Group 1	Group 2	Group 3	Group 4	Total
R3P5	< 65.60	65.60 – 69.76	69.77 – 74.25	> 74.25	
Scanning	40 (40)	40 (40)	41 (40)	43 (40)	164
Dissection	4 (4)	4 (4)	4 (4)	5 (4)	17

Sex	Females	Castrates	Entire males	Improvacs	Total
Scanning	82 (80)	60 (58)	14 (14)	8 (8)	164
Dissection	9 (8)	6 (6)	1 (1)	1 (1)	17

**The number between brackets is the selection target as described in Protocol I*

Table 2: Hot carcass weight (HCW)

HCW	Total	Mean (kg)		St. Dev.	Min (kg)	Max (kg)
Scanning	164	98.9	±	9.8	75.9	121.8
Dissection	17	99.9	±	8.7	86.1	117.4

2.2 Reference lean meat determination

The reference lean meat percentage (LMP_{TD}) is based on the total dissection of the left half carcasses and was calculated, as laid down in point 2.2 of Part A of Annex V of Commission delegated regulation (EU) No. 2017/1182 of 20 April 2017:

$$LMP_{TD} = 100 \times (\text{weight of lean meat}) / (\text{carcass weight})$$

The total dissection was replaced by assessing the lean meat percentage with a computer tomography (CT). The whole sample was CT scanned by the IFIP scanner (Siemens Emotion Duo, Erlangen, Germany), housed in a mobile trailer. The left side was prepared according to the procedure described in Walstra & Merkus (1996). The head, the front foot and the front shank were cut off. The prepared left side was put on the scanner table as well as the front shank. The scanning acquisition started at the jointing of the hind foot and shank, meaning that head and feet were not scanned. The acquisition parameters were these of the usual IFIP procedure: spiral scanning, voltage 130 kV, current intensity 40 mAs, thickness of slice 3 mm, pitch 1, Field of View (FoV) 500 x 500 mm, acquisition matrix 512 x 512, reconstruction filter B30S (soft tissues).

CT images were segmented to get the number of voxels in the muscle tissue: [0, 120] Hounsfield Units. This number is multiplied by the voxel volume (FoV / Matrix x slice thickness = 2.86 mm^3) to determine the volume of lean meat in half carcasses. The weight of lean meat is deduced from the volume of lean meat, using a scaling factor (corresponding physically to a density), which value is considered equal to 1.04.

The value of lean meat obtained by the CT scan is multiplied with a scaling factor δ, determined by the manual dissection of the 17 carcasses following the EU reference procedure for partial dissection of Walstra & Merkus (1996), extended by the procedure for a total dissection as described by Judas & Höreth (2009).

$$LMP_{CTadj} = 100 \text{ x (weight of lean meat obtained with CT) x } \delta \text{ / (carcass weight)}$$

The manual dissection was carried out by professional butchers under supervision of the CBKc (Cel Begeleiding Karkasclassificatie).

2.3 Statistical analysis

The statistical calculations of lean meat percentage was performed in accordance with Annex V of the Commission Delegated Regulation (EU) 2017/1182 of 20 April 2017. The $LMPCT_{adj}$ is used to calculate the prediction equation for the devices to be evaluated by regression.

The R-package *caret* as described by Kuhn (2008) was used to evaluate the linear models for the prediction of the hand held classification devices OptiGrade-MCP, FOM II, manual ZP, OptiScan-TP and OptiScan-TPC, and the results were confirmed by the OLS (Ordinary Least Squares) regression as described by Daumas & Causeur (2003).
The same package *caret* was used to calculate Partial least squares (PLS) regression for the automated methods: AutoFom III, AutoFom IV, CSB Image-Meater 2.0 and CSB Image-Meater 4.0. The useful variables are selected based on their VIP-values (*variable importance in prediction*). If the VIP is higher than 0.8, the variable is withhold in the model. To avoid overfitting, the maximum number of components in the PLS model is set as 3.
Next, a generalized linear model called Elastic net (Enet) is fit following the *glmnet*-package in R, wherein a combination of parameters α and λ is simulated to retrieve the combination that results in the lowest RMSEP-value. The α-value controls the 'elastic net penalty' and bridges the gap between ridge regression (α=0) and lasso regression (α=1), meaning that the closer this value is to 1, the less variables will be kept in the final model. The tuning parameter λ controls the overall strength of the penalty (Friedman et al., 2010).
Both models (PLS and Enet) are evaluated by their RMSEP-value as well as their final number of parameters withhold.
In any prediction model, the root mean squared error of prediction RMSEP is obtained by the leave-one-out full cross-validation method (Daumas & Causeur, 2003).

The obtained prediction equations will be valid for pig carcasses in the weight range of 60 – 140 kg warm carcass weight.

3 RESULTS

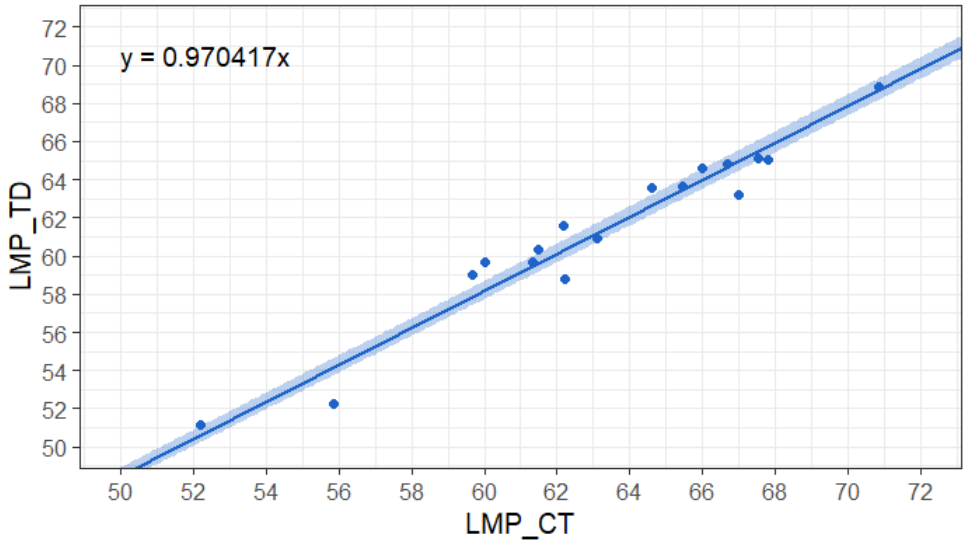
3.1 Reference lean meat determination

To determine the scaling factor δ, a linear model of the dissection data was constructed. The intercept was not significant (p>0.05), hence removed from the model. The value found was δ=0.970417 (±0.003979) lying outside of the confidence interval [0.960-0.970] of the French value 0.965 described by Daumas et al. (2019). For this reason, the found Belgian factor was kept as scaling factor in determining the reference lean meat determination. The model is illustrated in Figure 1. At the same time, the conversion factor from partial to full dissection was calculated, and found to be at 0.875 (±0.002), which is clearly lower than the previously used factor of 0.89, with as a consequence that the new average LMP will be about 1.5 units lower than the LMP calculated with the old formulas from the dissection trial in 2011.

$$LMP_{CTadj} = 100 \times (\text{weight of lean meat obtained with CT}) \times 0.970417 / (\text{carcass weight})$$

In the following parts of the protocol, LMP_{CTadj} is referred to as 'Reference LMP'.

Figure 1: Lean meat percentage from the manual dissection (LMP_TD) in function of the LMP calculated by the CT scan (LMP_CT)



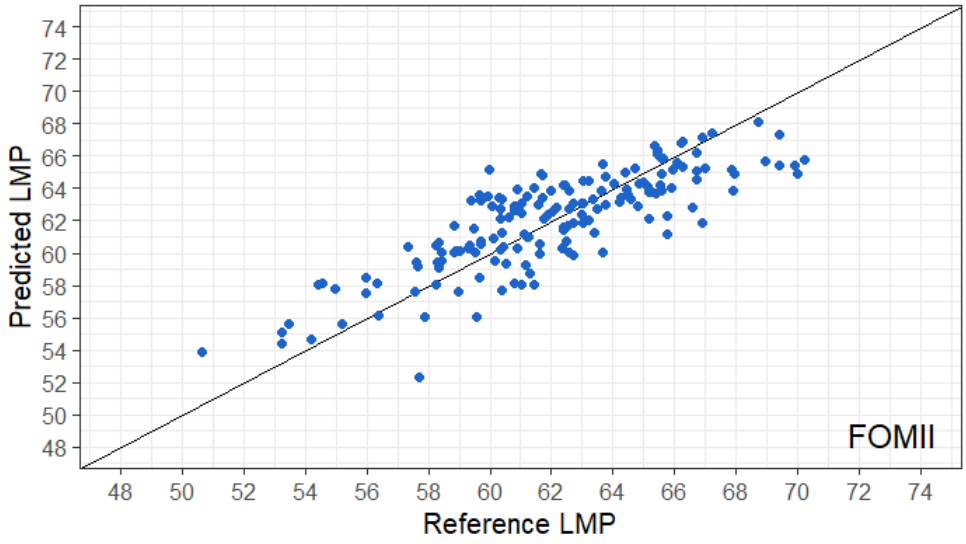
3.2 Prediction models of the apparatuses

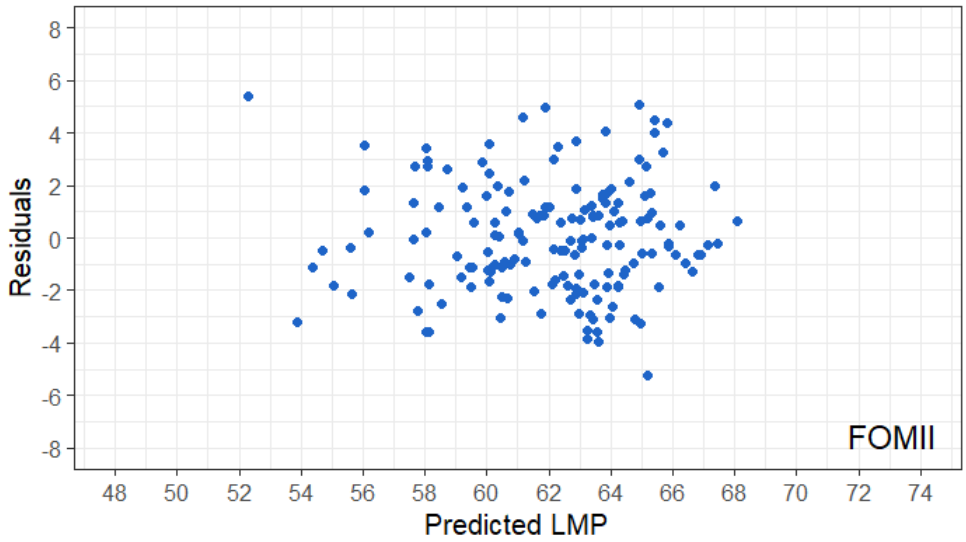
On the following pages, for each classification equipment the prediction formula and Root Mean Square Error of Prediction (RMSEP) are given, together with 2 graphs. The first figure shows the predicted LMP values calculated with the optimal formula (Predicted LMP) versus the reference lean meat percentages (Reference LMP) with the addition of 1:1 identity line. The second figure shows the residuals (Reference LMP – Predicted LMP) versus the predicted LMP values (Predicted LMP). For AutoFOM III and IV and Image Meater 2.0 and 4.0 the formulas were picked based upon the comparison of PLS and Enet, which is described in Annex II. The reference LMP, as well as the predicted LMP for all of the devices can be found in Annex III.

3.2.1 FOM II

$Y = 64.98677 - 0.82043 * X_1 + 0.11917 * X_2$	RMSEP = 2.15	N = 164

Y	Estimated lean meat percentage
X_1	Fat depth (including skin) (mm) measured perpendicularly to the back of the carcass (7 cm off the split line on the outside and ± 4 cm off the split line on the inside) between the 3rd / 4th last ribs
X_2	Muscle depth (mm) measured perpendicularly to the back of the carcass (7 cm off the split line on the outside and ± 4 cm off the split line on the inside) between the 3rd / 4th last ribs

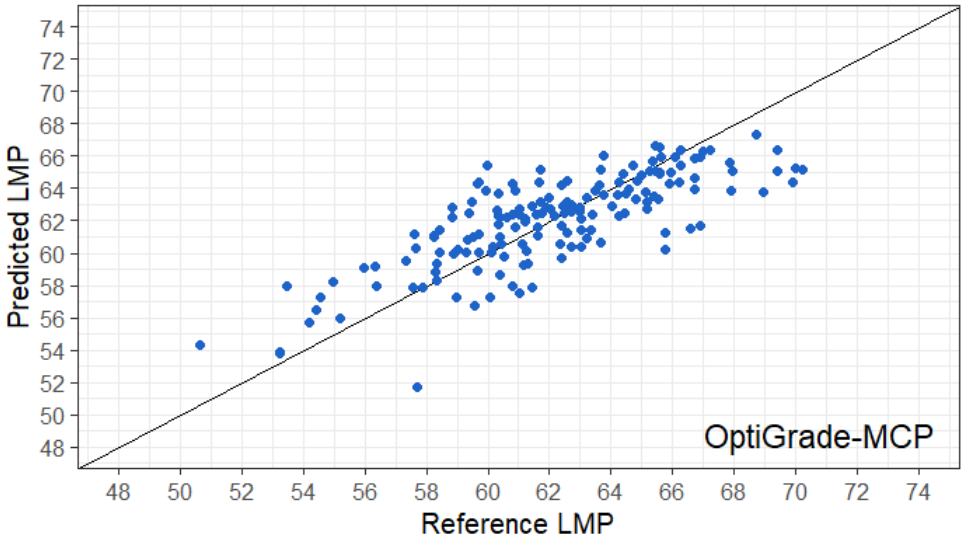


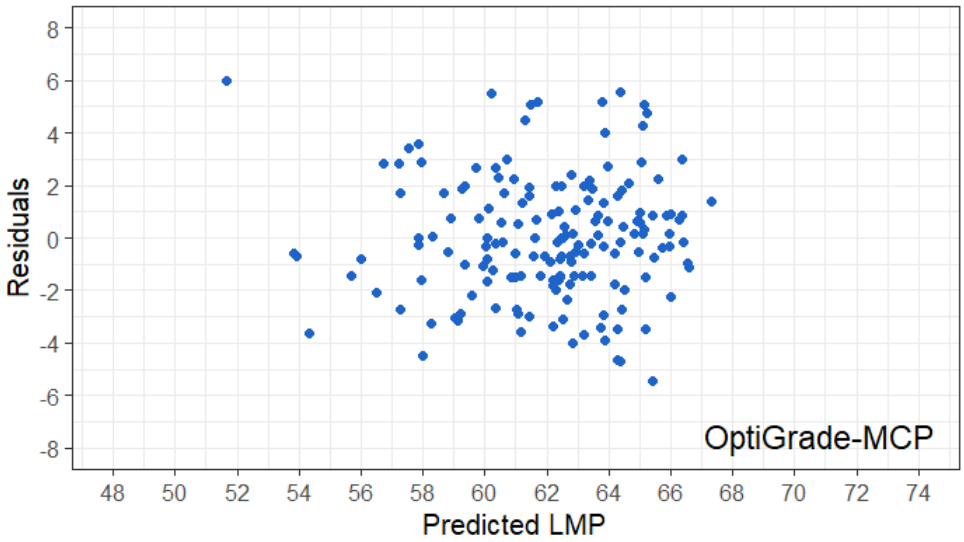


3.2.2 OptiGrade-MCP

$Y = 65.18582 - 0.83449 * X_1 + 0.12034 * X_2$	RMSEP = 2.36	N = 164

Y	Estimated lean meat percentage
X_1	Fat depth (including skin) (mm) measured perpendicularly to the back of the carcass (7 cm off the split line on the outside and ± 4 cm off the split line on the inside) between the 3rd / 4th last ribs
X_2	Muscle depth (mm) measured perpendicularly to the back of the carcass (7 cm off the split line on the outside and ± 4 cm off the split line on the inside) between the 3rd / 4th last ribs

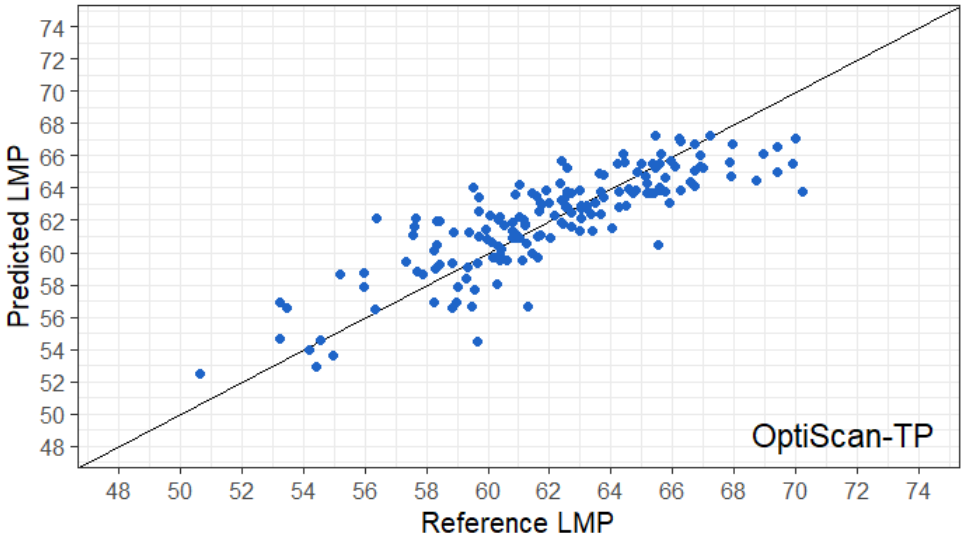


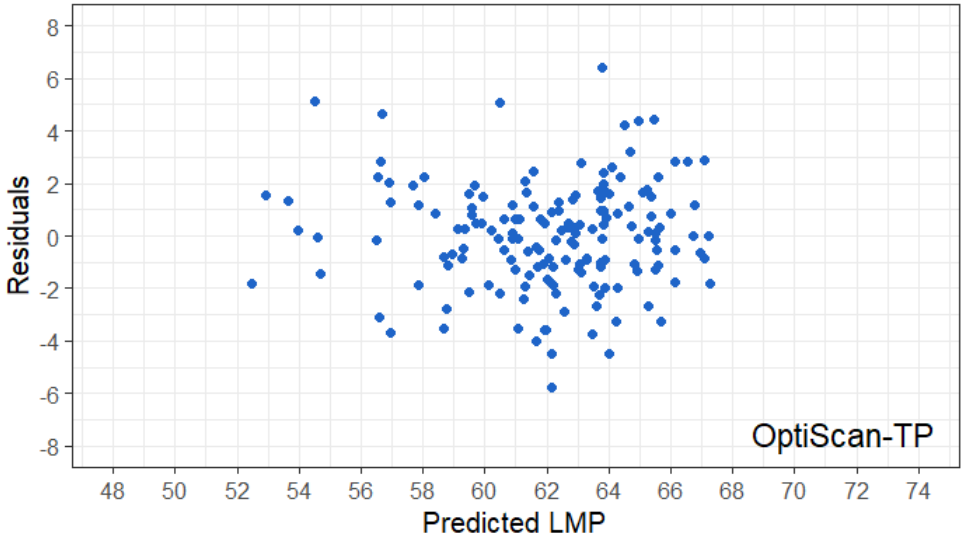


3.2.3 OptiScan-TP

$Y = 64.36031 - 0.67190 * X_1 + 0.08306 * X_2$	RMSEP = 2.06	N = 164

Y	Estimated lean meat percentage
X_1	Smallest fat depth (including skin) (mm) over the *musculus gluteus medius*
X_2	Lumbar muscle depth (mm) measured as the shortest distance from the front (cranial) end of the *musculus gluteus medius* to the upper (dorsal) edge of the spinal canal

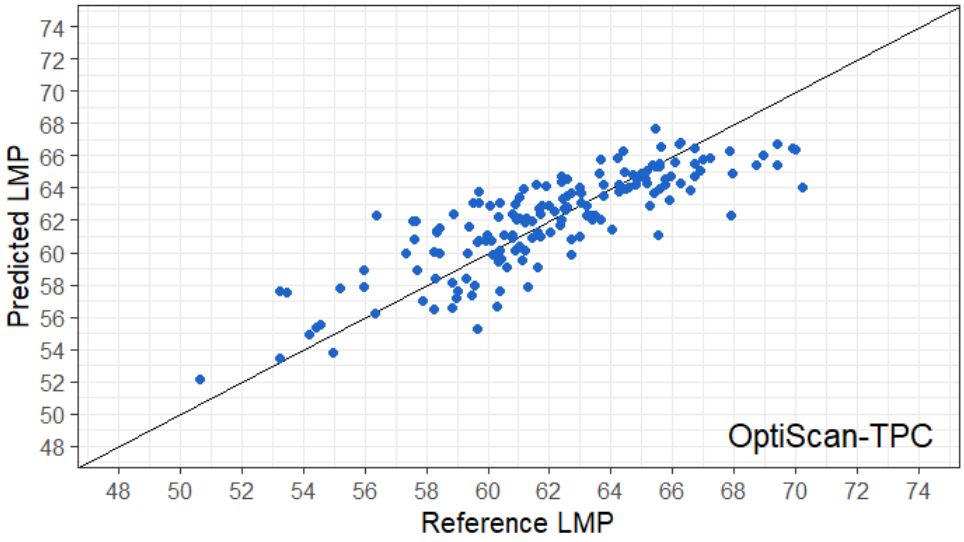


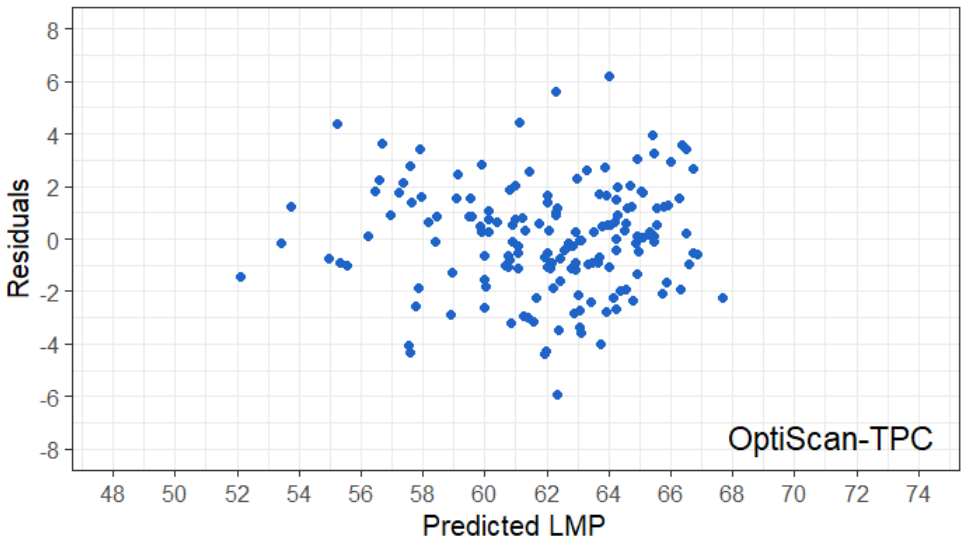


3.2.4 OptiScan-TPC

$Y = 64.88925 – 0.63908 * X_1 + 0.06647 * X_2$	RMSEP = 2.09	N = 164

Y	Estimated lean meat percentage
X_1	Smallest fat depth (including skin) (mm) over the *musculus gluteus medius*
X_2	Lumbar muscle depth (mm) measured as the shortest distance from the front (cranial) end of the *musculus gluteus medius* to the upper (dorsal) edge of the spinal canal

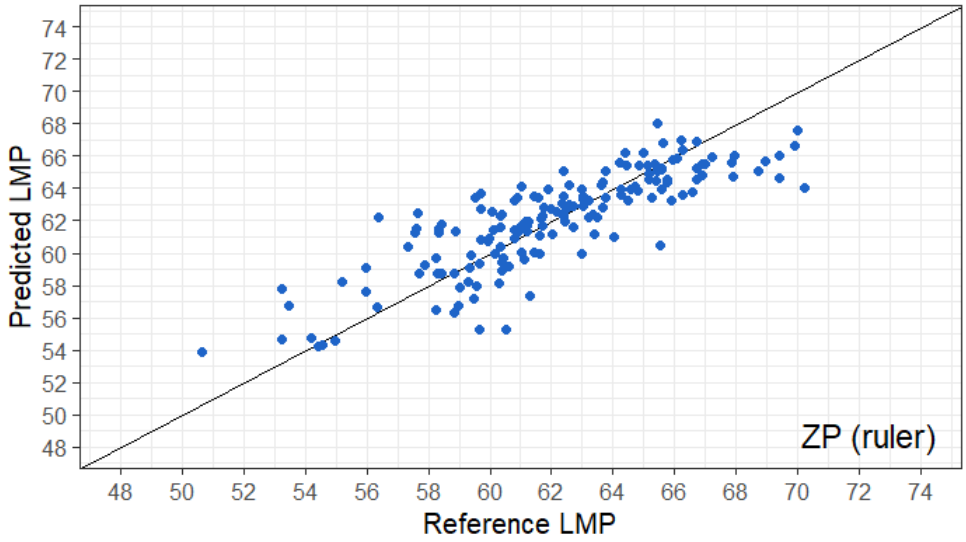


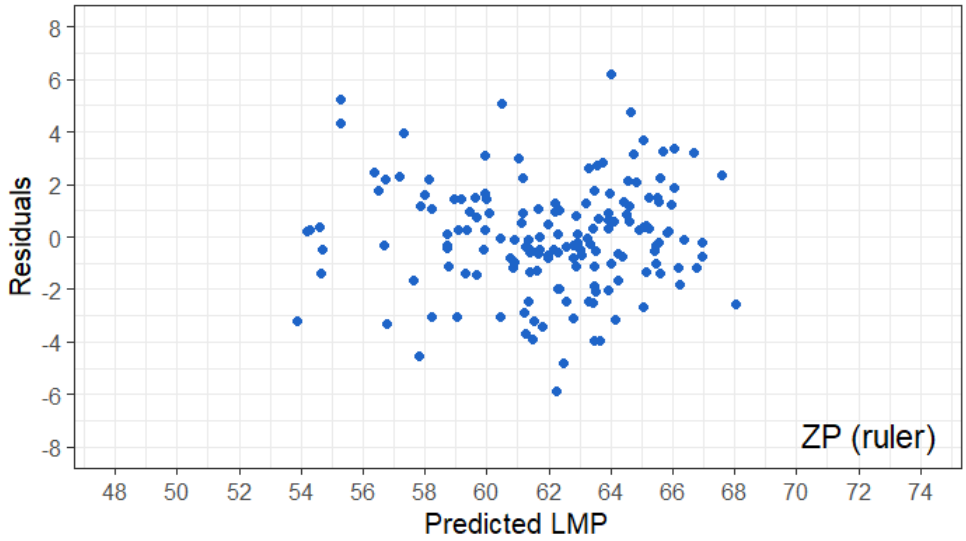


3.2.5 ZP (ruler)

$Y = 63.47584 - 0.65106 * X_1 + 0.08389 * X_2$	RMSEP = 2.08	N = 164

Y	Estimated lean meat percentage
X_1	Smallest fat depth (including skin) (mm) over the *musculus gluteus medius*
X_2	Lumbar muscle depth (mm) measured as the shortest distance from the front (cranial) end of the *musculus gluteus medius* to the upper (dorsal) edge of the spinal canal



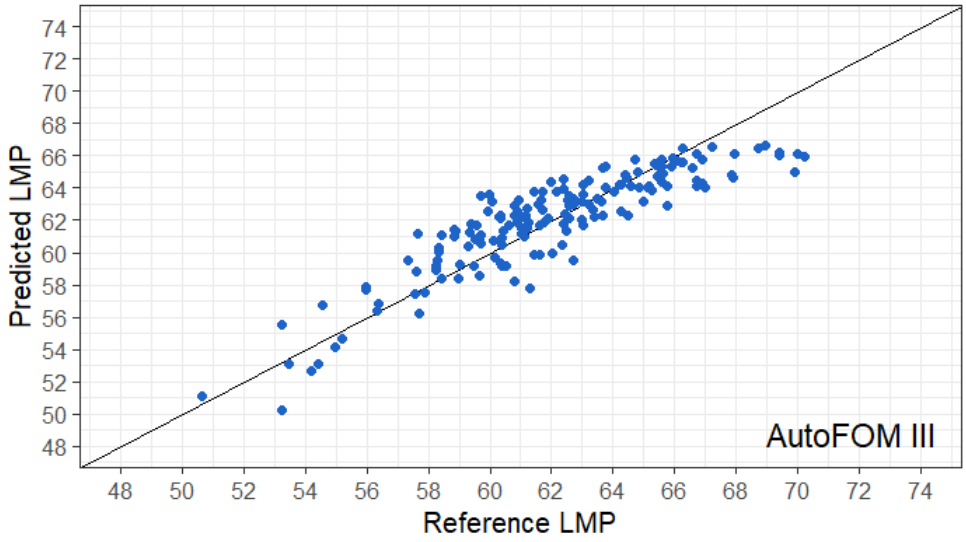


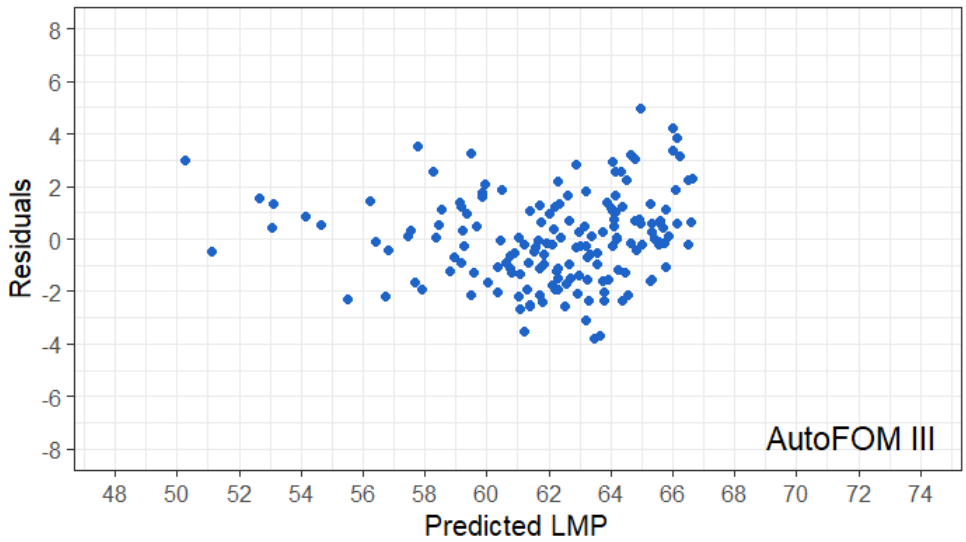
3.2.6 AutoFOM III

Y = 63.95763 – 0.35761 * R2P10 – 0.26503 * R2P8 – 0.30317 * R2P4 + 0.08574 * R3P5	RMSEP = 1.72	N = 164

Y	Estimated lean meat percentage
R2P10	The minimum fat thickness (mm) without skin in the carcass (defines MFT1 position*)
R2P8	Back fat thickness (mm) without skin in the MFT2 position*
R2P4	Back fat thickness (mm) without skin in the P2 position*
R3P5	The maximum loin depth (mm) of the entire carcass

*Positions are explained in Annex IV.



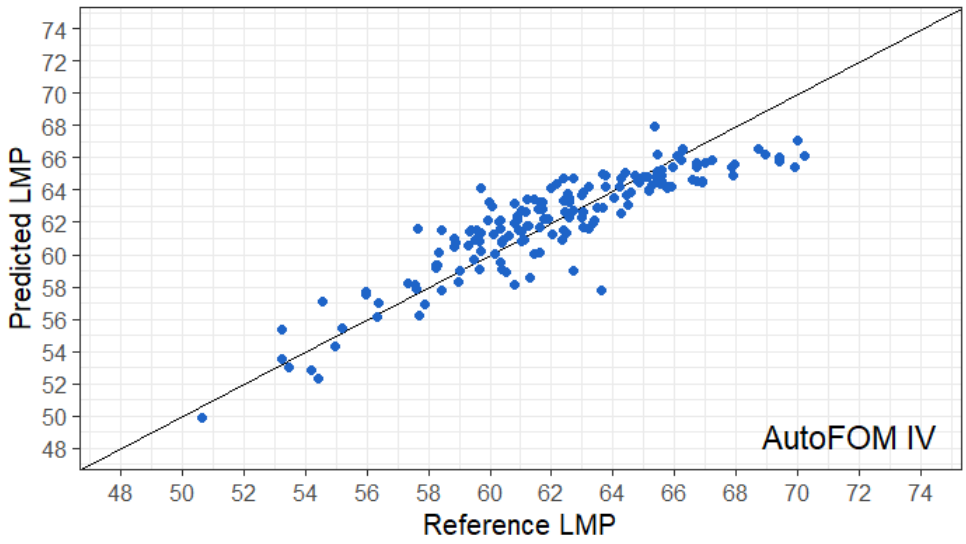


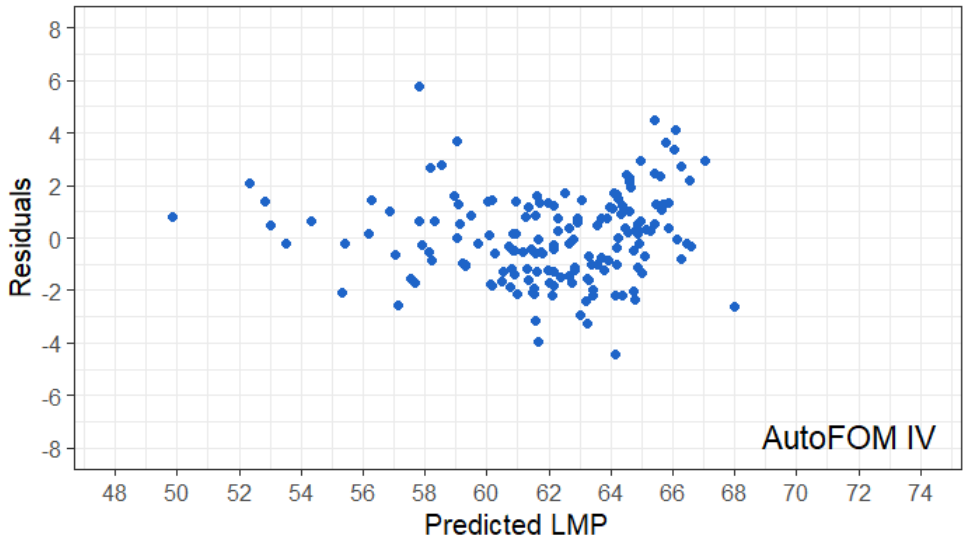
3.2.7 AutoFOM IV

Y = 62.52816 – 0.56134 * R2P10 – 0.30048 * R2P8 + 0.10289 * R3P5	RMSEP = 1.71	N = 164

Y	Estimated lean meat percentage
R2P10	The minimum fat thickness (mm) without skin in the carcass (defines MFT1 position*)
R2P8	Back fat thickness (mm) without skin in the MFT2 position*
R3P5	The maximum loin depth (mm) of the entire carcass

*Positions are explained in Annex IV.

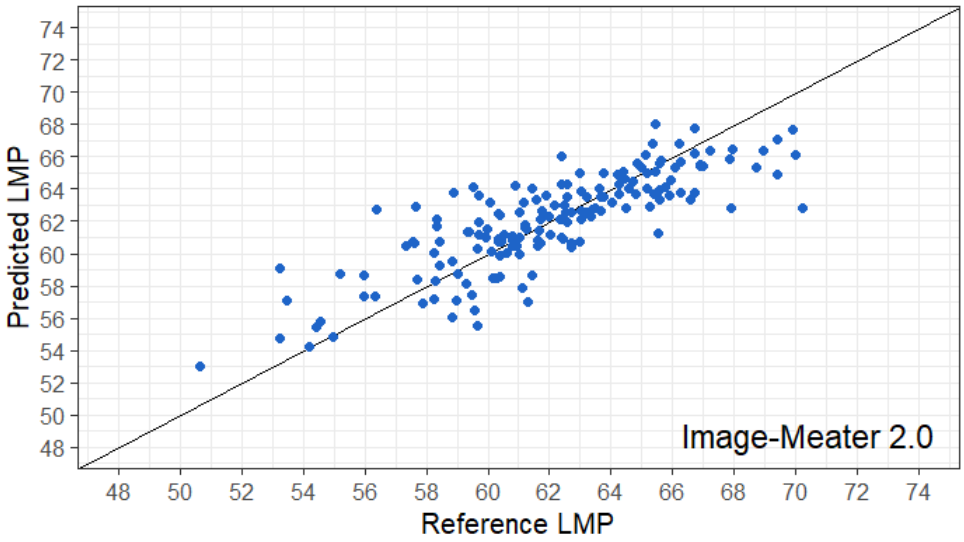


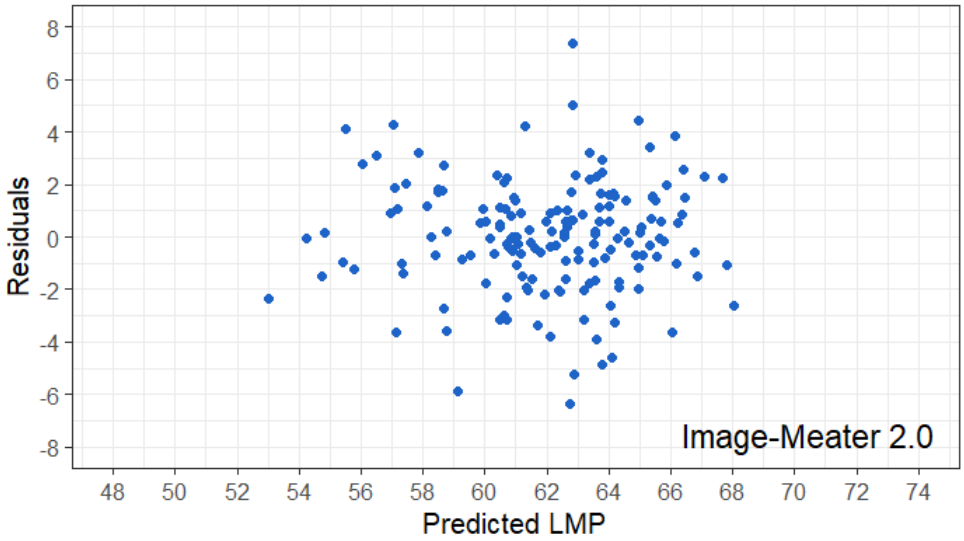


3.2.8 CSB Image-Meater 2.0

Y = 65.64227 – 0.19817 * ZPF + 0.02295 * ZPM – 0.21595 * MF + 0.05384 * MM – 0.17837 * V4F	RMSEP = 2.17	N = 164

Y	Estimated lean meat percentage
ZPF	Fat thickness (mm) as described in ZP method
ZPM	Muscle thickness (mm) as described in ZP method
MF	Mean fat thickness (mm) of the *musculus gluteus medius*
MM	Mean muscle thickness (mm) of the *musculus gluteus medius*
V4F	Mean fat thickness (mm) above the 4 vertebrae

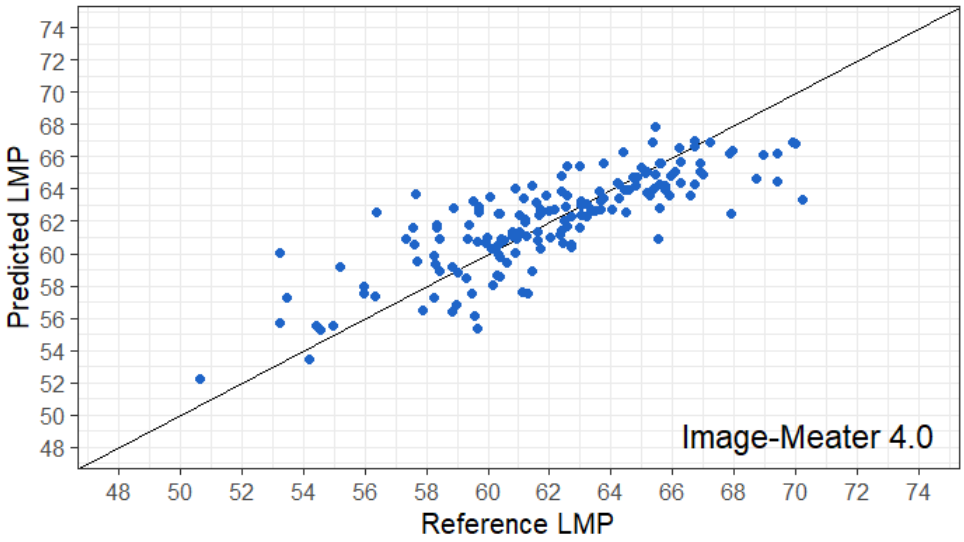


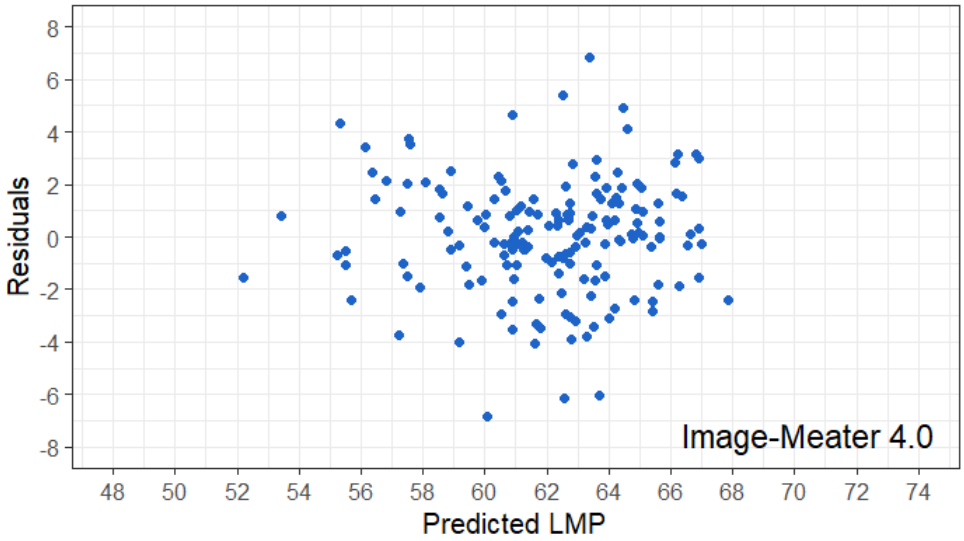


3.2.9 CSB Image-Meater 4.0

Y = 65.38538 – 0.18721 * ZPF + 0.02861 * ZPM – 0.20286 * MF + 0.05062 * MM – 0.17544 * V4F	RMSEP = 2.22	N = 164

Y	Estimated lean meat percentage
ZPF	Fat thickness (mm) as described in ZP method
ZPM	Muscle thickness (mm) as described in ZP method
MF	Mean fat thickness (mm) of the *musculus gluteus medius*
MM	Mean muscle thickness (mm) of the *musculus gluteus medius*
V4F	Mean fat thickness (mm) above the 4 vertebrae





4 CONTACT

This working document was written by Toon Rombouts and Marc Seynaeve. References to this document should be preferably made as follows:

Rombouts T., Seynaeve M., De Smet S. (2023) *Part 2 of the Protocol for updating and approval of pig carcass classification methods in Belgium*. EC Working document, June 2023, 17 p.

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ANNEX I: SELECTION OVERVIEW

NR = the number that is given to the carcass in the dataset (1-164)
Date = date of slaughter
AM = slaughterhouse number of the carcass
Farm = origin of the pig
CT = CT scanning order
Sex = sex of the carcass (Female/Castrate/Entire male/Improvac)
R2P10 = selection criterion for fat thickness (produced by AutoFOM III)
R3P5 = selection criterion for meat thickness (produced by AutoFOM III)
HCW = Hot carcass weight (kg)

NR	Date	AM	Farm	CT	Sex	R2P10	R3P5	HCW
1	6/03/2023	1127	68LH	7	Castrate	13.34	78.89	98.3
2	6/03/2023	1271	6327	6	Female	4.05	76.28	94.2
3	6/03/2023	1381	6327	2	Castrate	7.39	74.16	112.3
4	6/03/2023	1461	6292	1	Female	10.72	84.92	121.8
5	6/03/2023	1583	6327	3	Castrate	9.29	59.17	83.3
6	6/03/2023	1811	5Z7E	4	Female	7.86	70.25	84.0
7	6/03/2023	1959	67XX	11	Castrate	8.58	77.26	108.2
8	6/03/2023	2015	67XX	10	Castrate	7.15	74.82	103.8
9	6/03/2023	2077	67K1	9	Improvac	7.62	66.50	86.0
10	6/03/2023	2381	693A	5	Castrate	14.77	69.28	98.0
11	6/03/2023	2504	693A	8	Female	4.76	67.16	96.9
12	6/03/2023	2592	66AC	19	Castrate	16.20	69.44	88.4
13	6/03/2023	2697	6CH6	18	Female	5.96	68.95	97.0
14	6/03/2023	2790	5Z7E	17	Female	7.62	79.87	114.8
15	6/03/2023	2955	67K1	21	Improvac	8.34	57.05	88.0
16	6/03/2023	3345	69HH	14	Entire male	5.48	74.33	108.6
17	6/03/2023	3564	6C62	13	Entire male	3.81	65.20	99.8
18	6/03/2023	3634	6C62	12	Female	7.62	74.33	110.5
19	6/03/2023	3917	62LA	22	Female	16.20	54.44	87.9
20	6/03/2023	4183	631L	20	Female	5.48	68.79	79.8
21	6/03/2023	4238	62AL	16	Castrate	7.39	59.49	95.7
22	6/03/2023	4350	62AL	15	Female	4.53	55.91	89.6
23	7/03/2023	0496	6A0X	31	Entire male	10.01	59.17	100.5
24	7/03/2023	0804	6727	30	Female	7.15	70.58	86.1
25	7/03/2023	1981	66A3	28	Female	5.72	66.02	86.3
26	7/03/2023	2031	66A3	27	Castrate	7.39	81.83	103.6
27	7/03/2023	2196	6715	26	Female	5.24	57.70	91.2
28	7/03/2023	2206	6715	25	Castrate	9.05	57.05	104.8
29	7/03/2023	2900	62X6	23	Improvac	9.29	75.63	102.8
30	7/03/2023	2986	2LKK	24	Entire male	14.53	62.76	100.6
31	13/03/2023	0028	67NK	33	Improvac	4.76	64.71	91.4
32	13/03/2023	0213	6CKV	32	Entire male	5.24	64.71	89.8

33	13/03/2023	0336	6CKV	43	Female	10.24	73.02	112.0
34	13/03/2023	0463	NLAC	52	Castrate	18.11	70.25	93.2
35	13/03/2023	0607	6AEH	51	Female	7.86	63.08	81.7
36	13/03/2023	0661	6AEH	37	Improvac	7.39	66.50	89.3
37	13/03/2023	0928	603V	36	Castrate	13.58	74.65	108.6
38	13/03/2023	0955	603V	35	Female	5.96	74.49	99.6
39	13/03/2023	0999	66A6	34	Castrate	10.72	68.95	85.6
40	13/03/2023	1201	5X8P	45	Female	6.19	64.55	88.9
41	13/03/2023	1256	5X8P	44	Entire male	9.05	67.32	110.2
42	13/03/2023	1346	66VP	63	Improvac	6.43	70.09	91.3
43	13/03/2023	1483	NLAC	62	Castrate	8.81	69.93	99.5
44	13/03/2023	1505	NLAC	42	Castrate	11.44	75.47	102.8
45	13/03/2023	1677	6ACV	61	Female	5.24	72.37	97.6
46	13/03/2023	1817	5X88	50	Female	5.72	74.98	92.1
47	13/03/2023	2038	661C	49	Female	6.67	64.22	79.4
48	13/03/2023	2152	661C	48	Castrate	8.81	76.61	100.0
49	13/03/2023	2320	NN2H	47	Castrate	9.05	56.89	99.0
50	13/03/2023	2512	6162	46	Castrate	12.86	83.29	112.5
51	13/03/2023	2576	6A4E	41	Female	7.39	78.89	110.0
52	13/03/2023	2587	6A4E	40	Castrate	6.43	78.89	106.5
53	13/03/2023	2708	685H	39	Castrate	8.58	77.42	100.8
54	13/03/2023	2858	6997	60	Castrate	10.72	81.34	115.8
55	13/03/2023	2912	6997	59	Female	5.24	80.36	92.3
56	13/03/2023	3661	69E7	55	Improvac	20.01	59.49	93.8
57	13/03/2023	3988	6AK8	69	Female	5.00	64.22	91.4
58	13/03/2023	4189	6AP9	68	Female	4.29	78.08	105.6
59	13/03/2023	4390	62AL	67	Castrate	5.96	56.07	104.9
60	13/03/2023	4449	664H	54	Female	5.00	74.33	100.2
61	13/03/2023	4551	6749	53	Female	5.96	76.94	107.2
62	13/03/2023	4601	6749	64	Female	5.00	60.80	89.9
63	13/03/2023	4911	6835	65	Castrate	19.54	61.29	107.6
64	13/03/2023	4966	6835	70	Entire male	5.96	70.09	93.6
65	13/03/2023	5177	69AV	66	Castrate	12.86	79.22	102.3
66	13/03/2023	5310	69E7	57	Female	3.81	62.76	75.9
67	13/03/2023	5393	5Z42	56	Entire male	8.34	51.83	85.1
68	14/03/2023	0030	69H2	73	Improvac	7.86	69.11	100.3
69	14/03/2023	0259	H7E5	72	Female	12.15	76.28	101.6
70	14/03/2023	0287	H7E5	71	Female	12.86	80.52	98.7
71	14/03/2023	0411	68P3	84	Female	8.10	74.49	109.6
72	14/03/2023	0494	6892	83	Entire male	3.34	67.48	96.8
73	14/03/2023	0562	6892	96	Entire male	7.39	72.70	111.0
74	14/03/2023	0997	5ZXN	98	Female	6.43	87.04	104.2
75	14/03/2023	1073	5ZXN	99	Castrate	12.15	81.34	103.0
76	14/03/2023	1128	5P7C	97	Castrate	9.77	79.06	101.5

77	14/03/2023	1374	68KE	105	Castrate	7.62	71.88	96.7
78	14/03/2023	1417	68KE	104	Castrate	9.29	74.82	101.0
79	14/03/2023	1590	5X14	103	Castrate	7.62	73.84	108.3
80	14/03/2023	1632	5X14	102	Female	8.81	75.63	117.0
81	14/03/2023	1736	69LA	101	Female	7.86	80.52	103.5
82	14/03/2023	1842	6892	100	Female	9.29	77.42	105.2
83	14/03/2023	2184	655H	78	Female	6.19	65.53	76.5
84	14/03/2023	2192	6AH2	77	Female	5.00	79.54	102.5
85	14/03/2023	2402	655H	76	Castrate	4.29	56.72	86.5
86	14/03/2023	2748	65V3	75	Entire male	5.24	67.65	91.3
87	14/03/2023	2894	65V3	74	Female	8.10	65.85	99.2
88	14/03/2023	2942	6518	95	Female	4.05	77.59	100.0
89	14/03/2023	2953	6518	89	Female	5.24	64.06	89.0
90	14/03/2023	3190	6AH2	88	Female	5.48	63.24	87.2
91	14/03/2023	3334	5X56	82	Female	4.05	71.72	90.8
92	14/03/2023	3370	5X56	81	Castrate	10.72	73.84	106.2
93	14/03/2023	3502	5XP0	80	Female	7.15	59.49	76.7
94	14/03/2023	3543	5XP0	94	Female	3.57	68.13	91.4
95	14/03/2023	3640	673L	93	Female	5.96	67.16	87.8
96	14/03/2023	3764	673L	92	Castrate	10.96	69.60	100.1
97	14/03/2023	3879	62KH	91	Castrate	17.15	70.58	100.6
98	14/03/2023	3947	62KH	87	Castrate	13.34	67.48	98.5
99	14/03/2023	4052	5XP0	86	Castrate	11.20	74.65	108.3
100	14/03/2023	4153	65EH	85	Castrate	13.34	68.13	91.9
101	14/03/2023	4267	65EH	79	Female	5.24	68.95	91.1
102	14/03/2023	4337	63KN	90	Entire male	4.76	70.58	86.5
103	15/03/2023	0018	H9P4	138	Castrate	9.05	67.97	91.8
104	15/03/2023	0164	H9P4	137	Castrate	6.67	61.45	101.4
105	15/03/2023	0278	NLAC	136	Female	4.76	71.56	84.8
106	15/03/2023	0391	NLAC	135	Female	5.96	72.37	100.6
107	15/03/2023	0424	6060	134	Castrate	14.53	73.68	110.1
108	15/03/2023	0637	603V	133	Castrate	12.86	72.21	115.2
109	15/03/2023	0722	603V	132	Female	4.76	72.37	108.0
110	15/03/2023	0728	603V	131	Castrate	5.24	71.72	92.8
111	15/03/2023	0841	NLAC	130	Female	4.53	71.88	91.0
112	15/03/2023	0973	NLAC	129	Female	4.53	67.81	89.1
113	15/03/2023	1076	66L4	128	Female	4.05	71.56	91.3
114	15/03/2023	1168	6661	127	Female	13.34	77.26	108.7
115	15/03/2023	1171	6661	126	Female	9.29	69.28	97.9
116	15/03/2023	1292	6661	125	Female	10.72	65.36	88.1
117	15/03/2023	1300	6661	124	Female	10.48	72.05	104.5
118	15/03/2023	1679	6060	123	Female	5.48	70.91	108.8
119	15/03/2023	1732	6060	122	Castrate	11.67	68.95	89.3
120	15/03/2023	1871	NLAC	121	Female	4.29	68.46	77.7

121	15/03/2023	1879	NLAC	111	Female	10.01	73.68	95.4
122	15/03/2023	1965	672X	110	Female	4.76	60.80	89.0
123	15/03/2023	2135	672X	109	Female	11.67	74.65	116.9
124	15/03/2023	2195	5X02	108	Entire male	8.10	79.71	109.7
125	15/03/2023	2357	5Z56	107	Female	10.96	65.53	108.7
126	15/03/2023	2422	5Z56	106	Female	4.76	58.19	101.9
127	15/03/2023	2567	6712	119	Castrate	19.54	83.78	119.8
128	15/03/2023	2629	6712	118	Female	4.76	80.85	105.6
129	15/03/2023	2725	6CL0	116	Castrate	11.91	72.37	103.1
130	15/03/2023	2885	657A	115	Female	9.05	69.28	108.9
131	15/03/2023	3115	6AVE	114	Castrate	7.62	57.54	88.3
132	15/03/2023	3188	6AVE	113	Female	4.29	66.34	103.2
133	15/03/2023	3966	66K0	112	Female	6.91	65.04	91.7
134	15/03/2023	4061	6C11	120	Female	7.15	61.78	81.8
135	16/03/2023	0030	66KL	164	Female	11.91	68.62	107.7
136	16/03/2023	0062	66KL	163	Female	13.58	60.31	92.4
137	16/03/2023	0094	66KL	162	Female	12.15	70.42	111.9
138	16/03/2023	0240	5PKV	161	Female	7.86	66.50	103.8
139	16/03/2023	0407	5PKV	168	Entire male	8.81	72.86	113.0
140	16/03/2023	0714	69KP	167	Female	6.19	71.72	98.7
141	16/03/2023	0842	6678	155	Castrate	8.58	71.72	97.1
142	16/03/2023	1001	63L9	156	Castrate	9.05	71.72	102.4
143	16/03/2023	1078	63L9	142	Female	9.29	71.88	108.2
144	16/03/2023	1151	66CL	141	Castrate	8.58	69.28	105.1
145	16/03/2023	1204	66CL	140	Castrate	8.34	70.42	98.6
146	16/03/2023	1225	66CL	146	Female	6.19	68.30	97.4
147	16/03/2023	1345	6949	145	Castrate	7.86	65.36	100.5
148	16/03/2023	1390	6949	144	Castrate	9.53	72.86	110.8
149	16/03/2023	1465	2LKK	166	Female	12.15	68.46	107.5
150	16/03/2023	1673	5V4X	165	Female	8.81	71.56	110.8
151	16/03/2023	2271	6715	139	Female	8.58	62.10	117.4
152	16/03/2023	2343	6715	149	Castrate	9.05	65.53	105.4
153	16/03/2023	2360	6715	148	Castrate	8.34	63.57	117.4
154	16/03/2023	2520	5VNC	147	Castrate	7.15	69.93	106.5
155	16/03/2023	2618	62N5	152	Castrate	6.67	69.76	96.9
156	16/03/2023	2730	5VNC	151	Castrate	8.81	64.55	89.9
157	16/03/2023	2866	62N5	160	Castrate	8.10	65.20	94.6
158	16/03/2023	2904	62X6	159	Female	6.19	70.58	90.3
159	16/03/2023	3109	5VNC	158	Castrate	7.62	67.32	100.8
160	16/03/2023	3210	6949	157	Female	6.19	67.97	91.0
161	16/03/2023	3408	66CL	143	Castrate	6.67	68.79	102.5
162	16/03/2023	3416	66CL	150	Castrate	6.67	73.35	107.2
163	16/03/2023	3709	6H07	154	Female	7.39	72.21	99.7
164	16/03/2023	3749	6H07	153	Female	6.43	68.62	108.7

ANNEX II: MODEL CONSTRUCTION

The *caret* package offers the advantage that it can have different types of models as input (i.e. “lm”, “pls”, “glmnet”,…) as well as the type of crossvalidation. This makes it possible to process the model outputs all in the same way. For further information see https://topepo.github.io/caret/.

1.1 Handheld apparatuses

For these methods, a linear model is made (“lm”). No parameters are excluded, as there are only two available: fat thickness and meat thickness.

Formulas	Intercept	Fat	Meat	RMSEP
FOM_LM_164	64.98677	-0.82043	0.11917	2.14712
Optigrade_LM_164	65.18582	-0.83449	0.12034	2.35709
OptiscanTP_LM_164	64.36031	-0.67190	0.08306	2.06145
OptiscanTPC_LM_164	64.88925	-0.63908	0.06647	2.08671
ZP_LM_164	63.47584	-0.65106	0.08389	2.08256

1.2 AutoFOM

1.2.1 Parameter selection

Thirteen parameters are robust and recommended by Frontmatec to be used in the formula. Out of these 13, the parameters for skin thickness (R2P9, R2P5 and R2P1) are removed, ending up with 10 parameters tested in both PLS and Enet for AF3 as well as for AF4. Parameter explanations can be found in Annex IV.

R2P10	**R3P9**	**R2P8**	**R3P3**	**R4P6**	**R2P4**	**R3P1**	**R4P3**	**R2P15**	**R3P5**

1.2.2 Model selection

In case of PLS, only parameters R2P10, R2P8, R2P4 and R2P15 had a VIP higher than 0.8, meaning that no meat parameter was considered as important. In the opinion that at least one meat parameter should be considered, R3P5 was forced in the model, ending up with five parameters in the final model. This is the case for both AF3 and AF4. Both PLS models have their minimum RMSEP by using 3 components for these 5 parameters. No datapoints were removed as outliers.

Formulas	Intercept	R2P10	R2P8	R2P4	R2P15	R3P5	RMSEP
AF3_PLS_164	63.44479	-0.49582	-0.37722	-0.44724	0.34146	0.09977	1.70968
AF4_PLS_164	62.35449	-0.64096	-0.51041	-0.24803	0.52457	0.11152	1.70046

In case of Enet, a grid of 50x50 combinations of alpha and lambda is constructed. Alpha varying between 0.1 (bigger than 0 to force full ridge out of the possibilities) and 1. Lambda varying between 0.0008 and 5.36. The grid is in this case made by R (command tuneLength=50), but can also be manually chosen if wanted. The optimum for AF3 was found at alpha=0.5408163 and lambda=0.144609. The optimum for AF4 was found at alpha=0.8897959 and lambda=0.08372341. No parameter was forced in the model and no datapoints were removed as outliers.

Formulas	Intercept	R2P10	R2P8	R2P4	R2P15	R3P5	RMSEP
AF3_Enet_164	63.95763	-0.35761	-0.26503	-0.30317		0.08574	1.71791
AF4_Enet _164	62.52816	-0.56134	-0.30048			0.10289	1.71061

The selection of the final model is mainly based on common sense, looking for 'normal values' for the intercept as well as parameter coefficients. Both PLS and Enet have a normal intercept, lying close to the mean value of LMP used in the test (62.04%). Looking at the parameter coefficients, the PLS formula has a positive value for R2P15, which is counter-intuitive (and illogical) for fat thickness parameters. For this reason the Enet formula is preferred.

1.3 Image-Meater

1.3.1 Parameter selection

CSB provides 19 parameters that can be used in the formula. The parameter for skin thickness (RiF) is removed. For the fat and muscle thicknesses above the vertebrae, a choice needs to be made between the individual values (VaF, VaM, VbF, VbM, VcF, VcM, VdF, VdM), the calculated means (V4F and V4M) or the calculated means with subdivision (EF, IF and V4M). All three options were tried in the model, but individual values or subdivision did not prove to contain much additional information. For reason of simplicity and robustness, the calculated means are chosen, ending up with 8 potential parameters tested in both PLS and Enet. Parameter explanations can be found in Annex IV.

ZPF	ZPM	ML	MF	MM	VL	V4F	V4M

1.3.2 Model selection

In case of PLS, only parameters ZPF, MF, MM and V4F had a VIP higher than 0.8. This is the case for both IM2 and IM4. Additionally, ZPM is forced in the model as main meat parameter in the ZP method, ending up with five parameters in the final model. Both PLS models have their minimum RMSEP by using 2 components for these 5 parameters. No datapoints were removed as outliers.

Formulas	Intercept	ZPF	ZPM	MF	MM	V4F	RMSEP
IM2_PLS_164	65.64227	-0.19817	0.02295	-0.21595	0.05384	-0.17837	2.17201
IM4_PLS_164	65.38538	-0.18721	0.02861	-0.20286	0.05062	-0.17544	2.22043

In case of Enet, a grid of 50x40 combinations of alpha and lambda is automatically constructed (command tuneLength=50). The optimum for IM2 was found at alpha=0.1 and lambda= 0.1581166. The optimum for IM4 was found at alpha=0.1 and lambda=0.3242878. No parameter was forced in the model and no datapoints were removed as outliers.

Formulas	Intercept	ZPF	ZPM	ML	MF	MM	VL	V4F	V4M	RMSEP
IM2_Enet _164	75.29586	-0.26595		-0.01240	-0.18201	0.05044	-0.22904	-0.14173	0.04646	2.11526
IM4_Enet _164	74.93378	-0.25388	0.02905	-0.01074	-0.18340	0.04388	-0.23615	-0.11141	0.01378	2.15741

The selection of the final model is mainly based on common sense, looking for 'normal values' for the intercept as well as parameter coefficients. Enet is providing models that are on the alpha lower limit (0.1), hence withholding almost all the parameters and ending up with an unusual high intercept. For this reason the PLS formulas are preferred.

1.4 R – script

1.4.1 Import data

```
BE23<-"TrialBE23_data.xlsx"

selection<- read_excel(BE23, sheet = "Selection")
handheld<-read_excel(BE23, sheet = "Handheld")
AF3<-read_excel(BE23, sheet = "AF3")
AF4<-read_excel(BE23, sheet = "AF4")
IM2<-read_excel(BE23, sheet = "IM2")
IM4<-read_excel(BE23, sheet = "IM4")

data_handheld<-cbind(selection,handheld)
data_AF3<-cbind(selection,AF3)
data_AF4<-cbind(selection,AF4)
data_IM2<-cbind(selection,IM2)
data_IM4<-cbind(selection,IM4)
```

1.4.2 OLS/LM (illustrated FOR FOM II)

```
ctrl <- trainControl(method = "LOOCV")              #Leave-one-out
model <- train(ReferenceLMP~FOM_fat+FOM_meat,       #Model
               data=data_handheld,                  #Data
               method = "lm",                       #Method
               trControl = ctrl)                    #ctrl = LOOCV

coef(model$finalModel, intercept=TRUE) #extracts coefficients

PredictionLMP<-predict(model, newdata = data_handheld) #prediction used in the
graphs
print(model) #RMSE displayed is the RMSEP calculated as in Daumas & Causeur (20
03)
```

1.4.3 PLS (illustrated for AF3)

```
model<- plsr(ReferenceLMP~R2P10+R3P9+R2P8+R3P3+R4P6+R2P4+R3P1+R4P3+R2P15+R3P5,
data=data_AF3, validation="LOO")
summary(model) #check visually how many comps result in the lowest CV-value, in
this case 3
```

```
VIP(model, opt.comp=3) #If VIP<0.8, reject parameter in model. In this case par
ameters left: R2P10, R2P8, R2P4, R2P15. R3P5 is added to have a meat parameter
too. So new model: ReferenceLMP~R2P10+R2P8+R2P4+R2P15+R3P5.

ctrl <- trainControl(method = "LOOCV")                    #Leave-one-out
model <- train(ReferenceLMP~R2P10+R2P8+R2P4+R2P15+R3P5,  #Model
               data=data_AF3,                             #Data
               method = "pls",                            #PLS method
               trControl = ctrl,                          #ctrl = LOOCV
               tuneLength=3)                              #tuneLenght=what we de
fine as max ncomp desired
print(model)

summary(model)

opt<-as.numeric(model$finalModel$tuneValue) #chooses optimal ncomp for lowest R
MSEP, in this case 3
coef(model$finalModel, intercept=TRUE) #extracts coefficients from model with o
ptimal ncomp

RMSEP<-model$results[model$results$ncomp==opt,"RMSE"] #extracts RMSEP from mode
l with optimal ncomp
predictionLMP<-predict(model, newdata = data_AF3) #prediction used in the graph
s
```

1.4.4 Elastic Net (illustrated for AF3)

```
ctrl <- trainControl(method = "LOOCV")
model<- train(ReferenceLMP~R2P10+R3P9+R2P8+R3P3+R4P6+R2P4+R3P1+R4P3+R2P15+R3P5,
               data=data_AF3,          #Data
               method = "glmnet",      #glmnet method,
               tuneLength = 50 ,       #tuneLenght=size of grid we want to sear
ch for alpha and lambda (in this case 50x50).
               trControl = ctrl)

print(model) # grid combinations of alpha and lambda, with corresponding RMSEP

opt<-as.numeric(model$finalModel$tuneValue) #chooses optimal alpha and lambda f
or lowest RMSEP
coef(model$finalModel, model$finalModel$lambdaOpt) #extracts coefficients from
model with optimal lambda and alpha

model$results[model$results$lambda==model$finalModel$lambdaOpt & model$results$
alpha==as.numeric(model$finalModel$tuneValue[1]),] #extracts RMSEP from model w
ith optimal lambda and alpha

## [1] alpha    lambda   RMSE     Rsquared MAE
## <0 rows> (or 0-length row.names)

predictionLMP<-predict(model, newdata = data_AF3) #prediction used in the graph
s
```

ANNEX III: PREDICTED LMP VS REFERENCE LMP

NR = the number that is given to the carcass in the dataset (1-164)
AM = slaughterhouse number of the carcass
CT = CT scanning order
REF = Reference LMP
TD = LMP from total dissection (17 carcasses)
FOM = LMP predicted by FOM II
OG = LMP predicted by OptiGrade-MCP
OSTP = LMP predicted by OptiScan-TP
OSTPC = LMP predicted by OptiScan-TPC
ZP = LMP predicted by ZP
AF3 = LMP predicted by AutoFOM III
AF4= LMP predicted by AutoFOM IV
IM2 = LMP predicted by Image-Meater 2.0
IM4 = LMP predicted by Image-Meater 4.0

NR	AM	CT	REF	TD	FOM	OG	OSTP	OSTPC	ZP	AF3	AF4	IM2	IM4
1	1127	7	58.41		59.53	60.07	59.24	59.97	58.72	58.37	57.79	59.28	58.89
2	1271	6	69.98		64.90	65.24	67.07	66.38	67.60	66.14	67.05	66.14	66.81
3	1381	2	61.59		62.96	62.41	63.49	64.25	63.44	62.99	62.83	63.38	63.22
4	1461	1	61.10		61.18	60.53	59.49	59.55	59.62	61.04	60.92	57.88	57.60
5	1583	3	58.34		59.05	58.29	61.95	61.36	61.54	60.02	60.12	62.13	61.65
6	1811	4	61.20		63.55	61.92	61.75	61.91	61.70	62.70	63.42	61.61	61.98
7	1959	11	61.00		63.10	62.42	62.18	62.12	61.66	62.24	62.72	61.01	61.21
8	2015	10	64.02	64.59	64.30	62.93	61.55	61.44	61.01	63.75	63.54	63.14	62.74
9	2077	9	64.26		63.43	62.27	62.85	63.77	63.59	62.60	62.53	63.69	63.46
10	2381	5	57.68		52.30	51.68	58.82	58.95	58.78	56.22	56.26	58.38	59.51
11	2504	8	63.74		63.02	63.63	63.46	63.49	63.42	65.31	64.87	63.54	63.43
12	2592	19	55.18		55.58	56.00	58.69	57.76	58.22	54.64	55.41	58.77	59.19
13	2697	18	61.98		63.86	63.41	63.06	62.91	62.77	64.35	64.15	62.30	62.61
14	2790	17	62.15		62.81	62.32	62.30	62.57	62.54	63.75	64.36	63.02	62.73
15	2955	21	59.73		60.75	61.18	63.45	63.75	63.66	61.06	61.34	61.93	62.75
16	3345	14	66.57		62.86	61.50	64.35	63.85	63.76	65.26	64.66	63.35	63.61
17	3564	13	69.39		65.40	65.11	66.55	66.72	66.03	66.02	65.76	67.11	66.22
18	3634	12	60.94		62.86	62.44	61.05	62.02	61.41	63.28	61.55	60.46	60.92
19	3917	22	54.44		58.03	56.51	52.91	55.33	54.21	53.09	52.35	55.40	55.52
20	4183	20	67.85		65.15	65.61	65.61	66.28	65.61	64.78	65.42	65.87	66.19
21	4238	16	60.30		63.41	62.66	58.04	56.69	58.13	62.22	62.02	58.49	58.62
22	4350	15	65.00	63.19	64.38	64.84	65.54	64.92	66.18	63.21	64.85	65.32	65.38
23	0496	31	60.38	58.76	57.66	58.69	59.88	60.12	59.43	59.15	59.08	59.83	59.76
24	0804	30	63.50	63.65	62.76	63.84	63.08	62.32	62.21	63.39	62.93	62.84	62.64
25	1981	28	66.88		61.90	61.69	66.01	65.07	65.55	64.32	64.50	65.41	65.58
26	2031	27	65.78	65.01	62.29	61.30	63.81	64.59	64.43	64.13	64.09	64.15	63.93
27	2196	26	62.38		61.46	61.67	63.28	64.37	63.49	63.92	63.39	64.32	63.88
28	2206	25	58.32		60.64	59.35	60.48	61.25	61.22	60.33	60.16	61.68	61.79

29	2900	23	61.25	60.89	61.04	60.12	60.60	62.16	61.95	61.84	61.82	61.48	61.06
30	2986	24	53.24		55.06	53.91	56.94	57.59	57.80	55.53	55.35	59.12	60.08
31	0028	33	69.91		65.41	64.37	65.48	66.49	66.68	64.96	65.43	67.68	66.93
32	0213	32	67.89		63.85	63.86	64.70	62.29	64.73	64.65	64.94	62.85	62.50
33	0336	43	62.34		60.34	60.60	64.29	61.73	63.05	60.47	60.95	62.13	61.18
34	0463	52	54.21	52.27	54.67	55.68	53.99	54.95	54.71	52.67	52.83	54.25	53.42
35	0607	51	63.00		63.08	62.82	61.35	60.98	59.92	62.02	62.27	60.73	61.57
36	0661	37	63.66		60.05	60.69	63.77	65.74	64.39	62.34	62.93	63.56	63.27
37	0928	36	61.31		58.71	59.34	56.67	57.88	57.33	57.79	58.54	57.03	57.55
38	0955	35	65.17		63.81	62.77	64.30	65.10	64.58	64.14	63.97	65.00	65.11
39	0999	34	62.05		62.53	62.74	60.88	61.23	61.16	59.94	61.27	61.15	61.01
40	1201	45	61.72		63.46	63.16	61.11	60.99	61.72	63.76	63.25	60.68	60.28
41	1256	44	57.66		59.18	60.34	62.14	61.96	62.46	61.21	61.64	62.89	63.68
42	1346	63	65.17		62.15	63.20	63.73	64.26	64.89	64.01	64.06	64.00	63.74
43	1483	62	60.63		62.21	62.22	59.56	59.08	59.18	61.72	61.15	60.02	59.43
44	1505	42	61.43		58.02	57.86	59.93	60.89	60.00	59.84	60.04	58.68	58.90
45	1677	61	65.89		64.01	64.28	63.12	63.28	63.30	65.31	64.21	63.62	63.58
46	1817	50	65.55	65.15	64.21	63.37	60.46	61.12	60.48	64.95	64.42	61.30	60.87
47	2038	49	62.97		62.38	62.54	63.86	64.01	63.99	63.22	63.70	64.96	65.40
48	2152	48	62.42		64.22	62.93	61.79	63.35	61.95	62.37	62.65	60.93	60.65
49	2320	47	60.39		63.34	62.21	59.56	57.60	58.95	60.46	60.70	58.61	58.55
50	2512	46	59.50		61.54	63.18	56.65	57.37	57.19	59.19	59.69	57.44	57.49
51	2576	41	65.25		63.74	65.11	63.72	62.95	63.46	63.88	64.32	62.91	63.58
52	2587	40	63.04		64.44	60.36	62.16	63.11	62.94	64.22	63.91	62.65	62.38
53	2708	39	62.40		61.63	59.71	61.91	62.07	62.29	61.77	61.56	60.99	61.41
54	2858	60	60.09		60.90	60.07	60.62	60.76	61.41	60.73	61.28	60.15	60.31
55	2912	59	70.21		65.81	65.13	63.80	64.00	64.01	66.00	66.10	62.82	63.37
56	3661	55	53.26		54.38	53.82	54.68	53.41	54.63	50.26	53.49	54.75	55.68
57	3988	69	65.46		66.09	66.61	65.29	65.36	65.06	64.76	65.16	65.06	64.92
58	4189	68	66.73		66.24	65.87	65.07	65.53	65.25	66.14	65.65	66.21	66.62
59	4390	67	63.22		64.46	63.41	62.92	62.94	63.26	62.98	61.63	63.50	63.06
60	4449	54	66.21		66.83	64.39	67.10	66.74	66.97	65.57	65.85	66.78	66.54
61	4551	53	65.63		65.86	65.97	66.15	66.58	66.78	64.91	64.39	65.77	65.65
62	4601	64	66.72		64.60	64.62	64.11	64.70	64.56	64.13	65.46	63.80	64.27
63	4911	65	50.66	51.14	53.88	54.31	52.47	52.11	53.89	51.12	49.87	53.00	52.20
64	4966	70	63.19		62.00	60.94	62.71	62.27	62.21	64.45	64.21	62.59	62.27
65	5177	66	58.96		57.62	57.26	56.92	57.21	56.75	58.44	58.33	57.08	56.80
66	5310	57	65.34		66.64	65.72	65.48	65.46	65.55	65.54	67.98	66.85	66.89
67	5393	56	59.68		60.59	60.03	60.96	60.74	60.86	60.61	60.25	61.20	62.60
68	0030	73	63.40		61.22	62.38	61.31	62.02	61.16	62.20	62.15	62.77	62.68
69	0259	72	59.01		60.14	60.25	57.84	57.63	57.84	59.25	59.02	58.78	58.79
70	0287	71	59.65		58.46	58.90	54.53	55.24	55.30	58.55	59.12	55.52	55.33
71	0411	84	60.87		60.27	61.57	60.93	60.11	61.24	62.57	62.15	60.87	60.03
72	0494	83	68.96		65.69	63.76	66.15	66.00	65.69	66.65	66.25	66.42	66.14
73	0562	96	62.54		61.70	62.53	62.86	62.68	62.84	63.22	63.76	62.56	62.93
74	0997	98	65.37		63.73	63.49	63.66	63.68	64.52	65.39	64.85	63.73	64.08

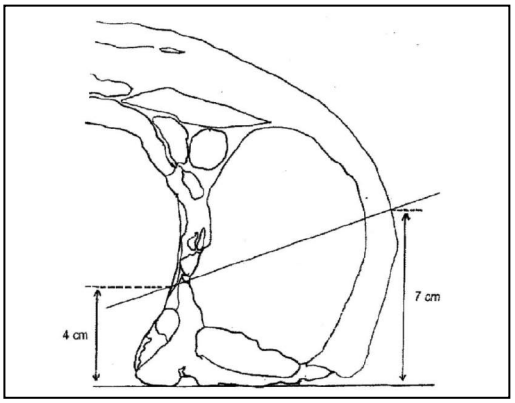
75	1073	99	60.17		59.56	60.36	59.70	59.89	59.92	59.68	60.06	58.47	58.06
76	1128	97	59.58		56.06	56.72	57.68	57.96	57.98	61.69	61.52	56.49	56.13
77	1374	105	62.71	63.55	63.07	62.59	62.48	60.81	61.64	62.99	62.78	60.64	60.55
78	1417	104	59.39		63.25	62.50	61.30	61.64	59.87	61.77	61.52	61.32	61.74
79	1590	103	61.67		64.95	64.41	62.59	62.77	62.14	63.23	63.28	61.41	62.39
80	1632	102	61.17		59.23	59.28	62.05	63.93	61.97	62.29	62.64	63.20	63.40
81	1736	101	60.81		62.61	64.29	61.88	62.42	63.30	62.91	63.19	60.46	61.10
82	1842	100	63.02		61.86	61.42	62.70	63.71	63.53	61.72	61.69	62.10	62.96
83	2184	78	62.55		63.91	64.51	63.74	63.48	62.99	62.90	63.54	63.53	63.61
84	2192	77	65.59		65.89	66.56	64.00	65.34	65.25	65.74	65.30	63.99	64.33
85	2402	76	63.78		64.75	66.01	64.83	64.22	65.13	64.04	64.18	64.96	65.60
86	2748	75	64.45		63.96	62.45	65.60	64.96	65.46	64.63	63.70	64.65	63.95
87	2894	74	60.33	61.56	62.70	63.73	62.09	62.18	62.29	62.10	62.15	62.43	62.46
88	2942	95	67.21		67.44	66.38	67.23	65.90	65.97	66.59	65.89	66.35	66.91
89	2953	89	63.05		63.12	62.15	62.93	63.08	63.34	63.58	62.66	63.86	63.26
90	3190	88	65.13		64.10	63.81	64.74	64.56	65.46	64.03	64.80	66.16	64.98
91	3334	82	67.94		64.94	65.06	66.76	64.91	66.05	66.08	65.59	66.45	66.38
92	3370	81	59.28		60.27	60.08	58.41	58.42	58.22	60.36	60.55	58.12	58.52
93	3502	80	64.51		63.62	63.66	62.94	63.98	63.22	62.30	63.06	62.79	62.59
94	3543	94	68.73	68.85	68.09	67.32	64.51	65.45	65.06	66.49	66.56	65.31	64.62
95	3640	93	64.24		63.41	64.37	63.81	64.23	63.93	64.20	64.72	64.29	64.33
96	3764	92	57.36		60.42	59.56	59.47	59.96	60.42	59.51	58.23	60.49	60.88
97	3879	91	54.98		57.78	58.26	53.65	53.75	54.58	54.13	54.35	54.83	55.49
98	3947	87	54.54		58.13	57.26	54.59	55.57	54.27	56.72	57.11	55.75	55.22
99	4052	86	61.60		60.00	61.61	59.67	59.12	59.96	59.85	60.17	60.46	60.80
100	4153	85	57.58		57.62	57.84	61.08	61.94	61.24	57.45	58.11	60.72	61.62
101	4267	79	64.79		62.90	63.33	63.84	64.18	63.91	65.02	64.57	63.67	64.17
102	4337	90	66.28		65.34	65.43	63.85	64.29	63.57	65.60	66.57	63.80	64.42
103	0018	138	58.83		60.05	62.20	59.33	58.16	58.70	61.41	60.98	59.51	59.17
104	0164	137	61.70		64.79	65.18	63.10	62.43	62.27	62.64	62.84	62.10	62.74
105	0278	136	66.09		65.61	65.95	65.35	65.57	65.88	65.69	66.16	65.38	65.11
106	0391	135	64.59		63.36	63.94	63.91	64.06	63.93	64.11	63.86	64.00	63.93
107	0424	134	56.38		56.17	57.96	62.14	62.33	62.25	56.82	57.03	62.74	62.55
108	0637	133	60.81		58.10	57.94	61.39	61.08	61.41	58.24	58.15	60.85	61.31
109	0722	132	64.70	64.84	65.30	65.45	63.73	64.85	64.10	65.76	64.93	64.49	64.76
110	0728	131	63.67		65.56	65.19	62.39	62.00	62.86	65.26	64.99	62.65	62.73
111	0841	130	65.96		65.18	65.00	65.65	64.75	65.80	65.86	65.41	64.57	64.86
112	0973	129	65.58		64.95	64.98	65.49	65.48	65.15	65.31	64.94	65.63	65.62
113	1076	128	69.38		67.38	66.37	64.97	65.43	64.64	66.21	66.04	64.95	64.48
114	1168	127	57.89	59.01	56.07	57.87	58.68	56.97	59.29	57.56	56.88	56.96	56.47
115	1171	126	60.36		61.26	60.98	62.22	63.08	62.35	60.89	60.86	62.40	62.49
116	1292	125	60.34		62.11	62.31	62.03	59.87	61.62	59.36	59.49	60.74	59.99
117	1300	124	62.73		59.86	60.42	61.58	59.90	61.64	59.48	59.03	60.38	60.42
118	1679	123	64.40		64.99	64.94	66.15	66.30	66.22	64.83	65.12	65.09	66.29
119	1732	122	58.23	59.67	60.47	61.09	60.11	60.03	59.67	58.93	59.31	60.01	59.89
120	1871	121	66.89		67.15	65.99	65.37	65.10	64.81	65.78	64.60	65.49	65.05

121	1879	111	58.83		61.73	62.84	56.56	56.57	56.35	61.01	60.48	56.03	56.36
122	1965	110	66.71		65.09	63.97	66.72	66.49	66.93	64.49	64.58	67.79	67.00
123	2135	109	58.29		59.43	58.80	58.96	58.42	58.72	59.55	59.32	58.28	59.39
124	2195	108	65.74		61.14	60.21	64.63	64.23	64.58	62.89	64.24	64.17	64.22
125	2357	107	58.25		58.04	61.00	56.95	56.46	56.51	59.16	59.21	57.18	57.29
126	2422	106	62.40		64.26	64.19	65.69	64.78	65.06	64.54	64.78	66.03	64.83
127	2567	119	53.48		55.62	57.99	56.57	57.52	56.79	53.05	53.00	57.12	57.24
128	2629	118	66.27		66.88	66.42	66.93	66.86	66.38	66.48	66.47	65.68	65.65
129	2725	116	60.53		59.36	59.79	61.69	61.06	55.30	59.14	58.93	61.15	60.81
130	2885	115	59.65	60.36	63.61	64.29	59.36	60.68	59.37	60.77	60.81	60.32	60.71
131	3115	114	60.90		63.96	63.83	63.59	63.01	63.40	61.84	62.37	64.18	64.01
132	3188	113	65.44		66.42	65.13	67.25	67.69	68.02	65.54	66.25	68.05	67.87
133	3966	112	63.60		63.85	64.21	64.93	64.92	64.24	63.14	57.81	64.07	63.87
134	4061	120	63.35		63.36	61.43	62.39	62.31	62.35	62.64	61.99	62.33	62.71
135	0030	164	57.61		59.46	61.18	61.64	60.84	61.49	58.81	57.89	60.62	60.54
136	0062	163	56.34		58.13	59.21	56.50	56.21	56.66	56.42	56.17	57.33	57.34
137	0094	162	55.98		57.50	59.12	58.77	58.90	59.05	57.66	57.70	58.69	57.92
138	0240	161	61.89		62.37	62.79	63.88	64.14	63.93	62.11	62.17	63.57	63.57
139	0407	168	61.00		58.07	57.56	64.25	63.43	64.16	61.50	61.41	62.60	62.39
140	0714	167	65.60		63.86	64.93	63.83	63.94	63.95	64.38	64.58	63.38	62.83
141	0842	155	62.56		60.08	61.22	62.79	62.85	63.03	62.16	62.31	61.96	61.71
142	1001	156	60.44		60.37	60.59	60.23	59.58	59.69	61.32	60.90	60.70	60.91
143	1078	142	62.47		60.70	62.49	63.31	62.76	62.77	61.38	61.32	62.99	62.05
144	1151	141	61.22		61.04	62.13	61.65	60.14	61.32	61.55	61.77	61.80	62.16
145	1204	140	60.34		60.25	61.77	60.43	59.47	60.42	62.27	61.63	60.89	60.61
146	1225	146	64.84		64.27	64.44	64.96	64.53	65.40	64.08	64.45	65.57	64.73
147	1345	145	60.78		62.89	62.39	60.89	60.89	60.90	62.28	62.00	61.06	61.27
148	1390	144	58.87		60.13	59.95	61.27	62.36	61.32	61.38	60.73	63.76	62.80
149	1465	166	55.99		58.51	59.05	57.86	57.87	57.65	57.90	57.52	57.37	57.49
150	1673	165	61.63		60.61	61.08	60.98	61.30	61.09	61.66	61.67	60.86	61.38
151	2271	139	59.51	59.71	60.03	61.00	64.01	63.11	63.44	60.80	60.91	64.09	63.30
152	2343	149	58.41		60.06	61.41	61.99	61.56	61.81	61.06	61.55	60.71	60.89
153	2360	148	59.35		60.50	60.83	59.11	59.99	59.10	61.28	61.45	61.37	60.95
154	2520	147	62.73		61.86	63.02	63.72	63.65	62.92	63.33	64.75	62.57	62.31
155	2618	152	59.96		65.20	65.43	60.86	61.07	60.90	63.63	63.24	61.54	61.02
156	2730	151	61.01		62.47	62.75	60.89	60.38	60.09	61.20	60.86	59.96	61.37
157	2866	160	61.73		62.17	62.45	63.02	62.91	62.86	61.91	62.17	62.62	62.53
158	2904	159	64.20		63.15	63.57	65.50	65.86	65.61	64.21	64.23	64.88	64.38
159	3109	158	59.95		63.54	63.86	61.42	60.78	60.74	62.54	62.12	61.03	60.62
160	3210	157	66.97		65.27	66.28	65.23	65.76	65.48	64.05	65.67	65.43	64.92
161	3408	143	62.59		62.70	63.19	65.29	64.53	64.24	63.54	63.27	64.32	65.42
162	3416	150	61.45		64.07	62.90	63.69	62.00	63.53	63.80	63.42	64.07	64.18
163	3709	154	60.08		62.95	57.23	62.29	62.89	62.54	63.18	63.01	63.21	63.52
164	3749	153	59.69		63.24	64.38	62.56	63.08	62.77	63.48	64.14	63.60	62.90

ANNEX IV: TECHNICAL DESCRIPTION

1.1 FOM II

The Fat-O-Meat'er II (FOM II) probe basically consists of an optical sensor element, a depth measurement device and a data acquisition and analysis board along with a display.
The 6 mm probe is inserted in the pig carcass left half between the 3rd and 4th last ribs and perpendicularly to the back of the carcass at 7 cm off the split line on the outside and ± 4 cm off the split line on the inside. A specific optical band width (infrared) is used to provide the optimum information between and within the various tissues. The Constant Force Torsion Spring Principle determines the movement of the probe throughout the carcass half with an accuracy of 0.3 mm. The probe sensor has a measuring range of 0 – 125 mm.



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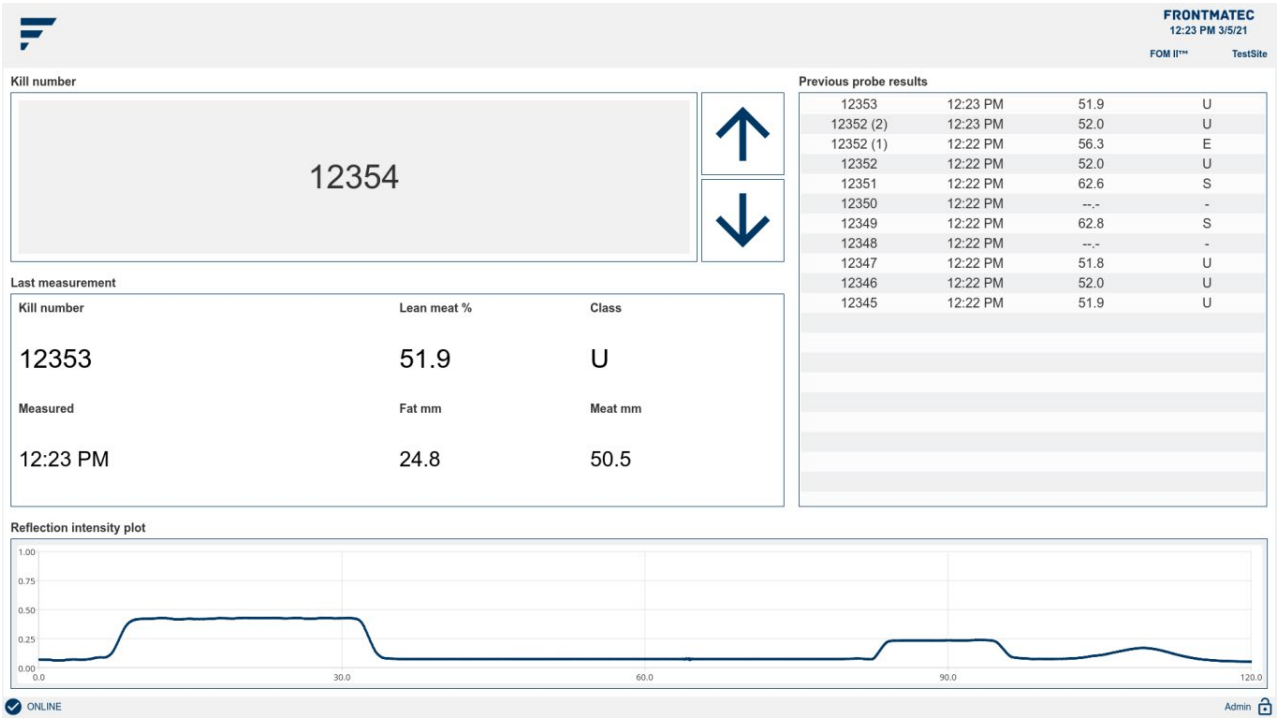
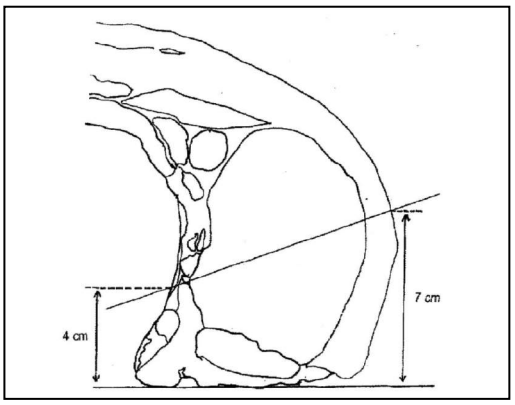


1.2 OptiGrade-MCP

The OptiGrade-MCP probe basically consists of an optical sensor element, a depth measurement device and a data acquisition and analysis board (inside the device). The data can be displayed on a separate laptop screen. The 6 mm probe is inserted in the pig carcass left half between the 3rd and 4th last ribs and perpendicularly to the back of the carcass at 7 cm off the split line on the outside and ± 4 cm off the split line on the inside. A specific optical band width (infrared) is used to provide the optimum information between and within the various tissues. The probe sensor has a measuring range of 0 – 125 mm.



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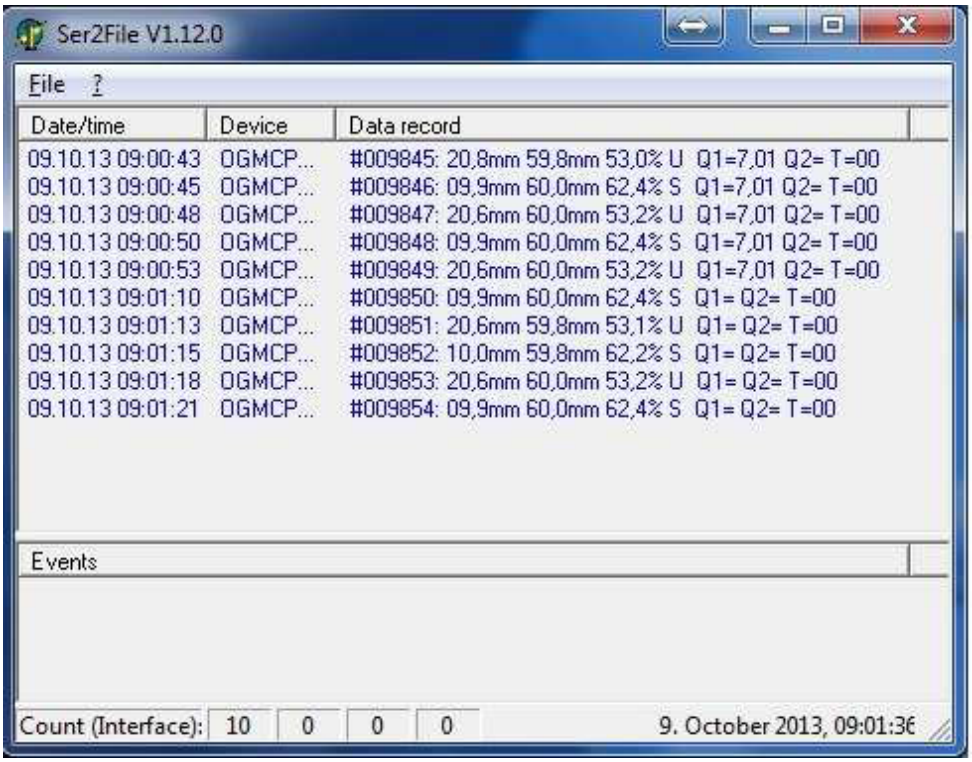
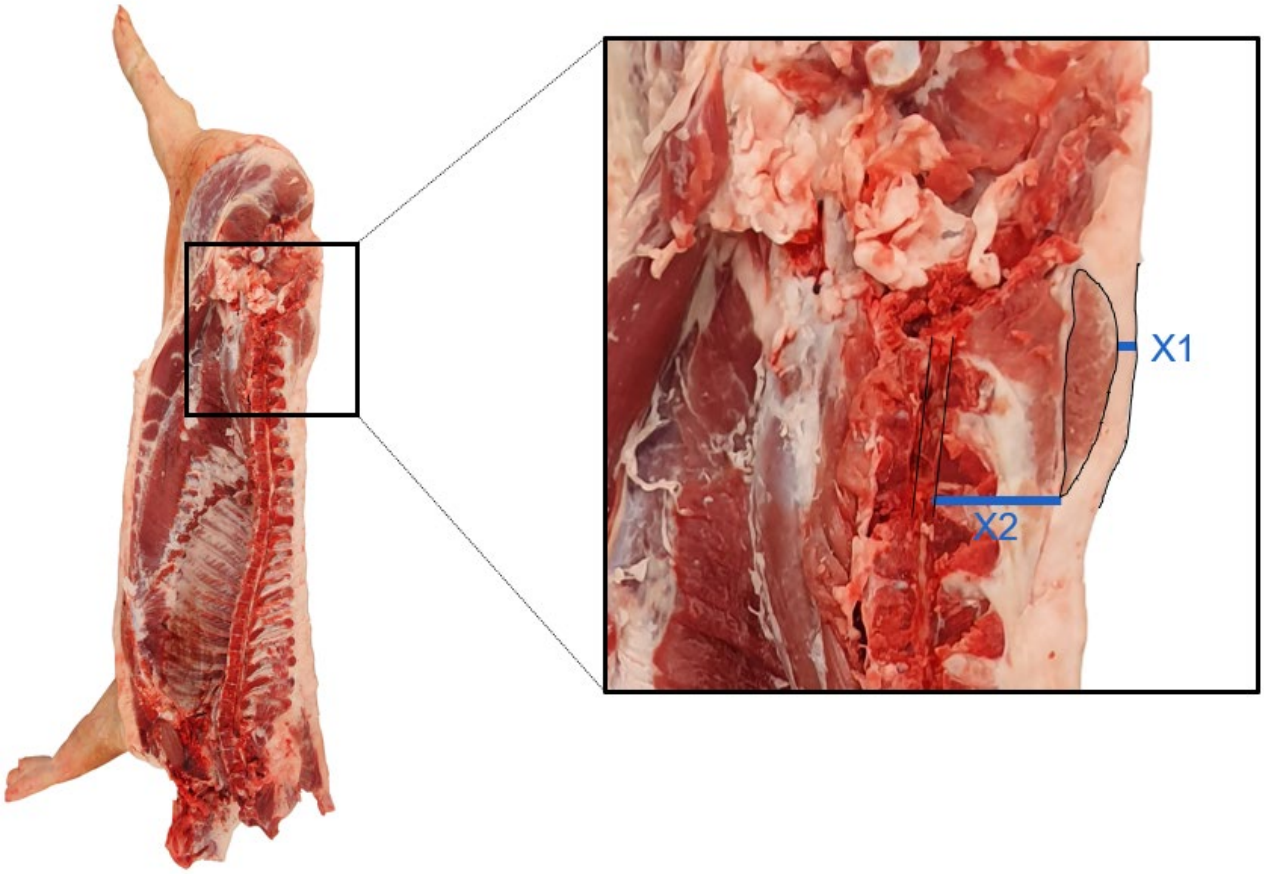


1.3 Manual ZP- method

The “Zwei-Punkte Messverfahren”- method (ZP) consists of two measurements:

X1: smallest fat depth including skin (mm) over the *musculus gluteus medius*
X2: lumbar muscle depth (mm), measured as the shortest distance from the front (cranial) end of the *musculus gluteus medius* to the upper (dorsal) edge of the spinal canal

The measurement is done with a simple ruler (accuracy 1 mm).



1.4 OptiScan-TP

The OptiScan-TP probe consists of a digital camera, an extension to standardize the distance from the camera guide (with spring-loaded ruler) and a data acquisition and analysis board (inside the device). Two measurements are done following the ZP-principle (see 1.3). For the first measurement, the extension is placed at the X1 position for measuring backfat thickness. For the second measurement, the ruler is hooked into the spinal canal and the extension is placed at the X2 position for measuring lumbar muscle thickness.

This results in two images, as displayed below.

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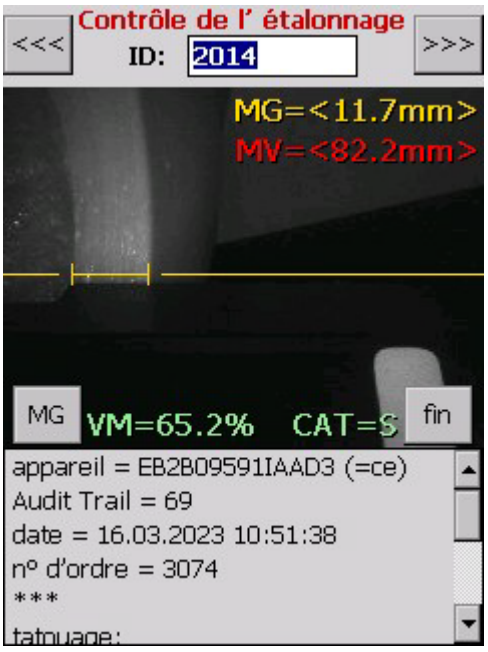

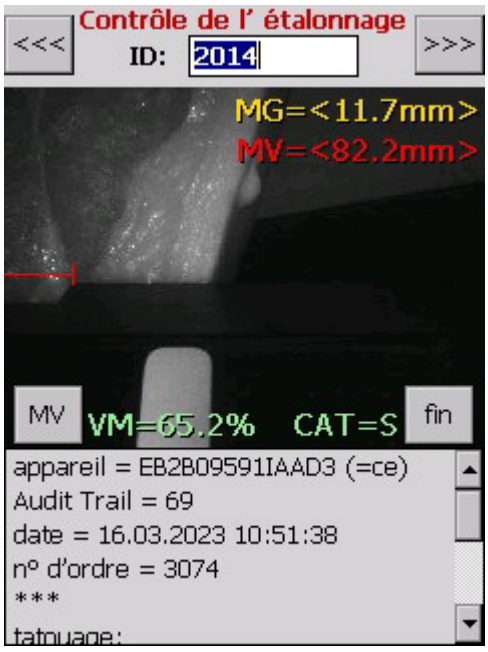

1.5 OptiScan-TPC

The OptiScan-TPC probe consists of a digital camera, an extension to standardize the distance from the camera guide (with spring-loaded ruler) and a data acquisition and analysis board (inside the device). The method is based on the ZP-principle (see 1.3), but only needs one measurement. The ruler is hooked into the spinal canal and the extension is placed at the X2 position for measuring lumbar muscle thickness. At the same time, a picture is taken of the lumbar area, indicating the X2 position and measuring the backfat thickness.

This results in one image, as displayed below.

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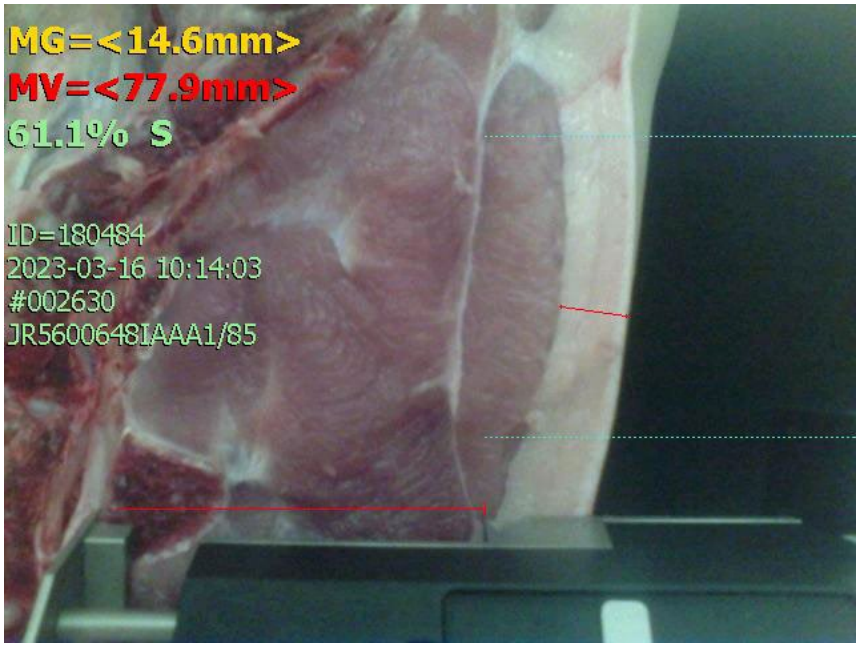

1.6 AutoFOM III and IV

The AutoFom III and AutoFom IV are based on ultrasound technology and provide a digitized 3D scan of the carcass. The ultrasonic image is generated by 16 (AutoFom III) and 25 (AutoFom IV) transducers embedded in a stainless-steel array. The number of measurements is dependent on the conveyor speed and the length of the carcass. In this experiment, the number of slices per carcass was 850 for AutoFom III and 900 for AutoFom IV producing a total of 13600 A-scans for AutoFom III and 22500 A-Scans for AutoFom IV.

Ultrasound-imaging technology like AutoFom transmits high-frequency sound pulse through tissue. The ultrasound waves are reflected back to the transducer by boundaries between tissues (bones, muscle and fat). Variations in the acoustic impedance between tissues of bones, muscle and fat cause echoes that can be converted into a digital image of the different tissue layers. The different image parameters (fx. R2P1-R2P10) are found using image analysis on the aggregated ultrasonic image.

The measurements used for the models are an overall size assessment and properties derived from two selected cross-sections. The two cross-section positions are at the minimum fat in the loin and at the loin to ham intersection.

The measurement principle of the AutoFom III and AutoFom IV is to a large extend identical, although they do not share any single component. The main differences are that the AutoFom IV has more transducers, higher sample rate and digitizing of ultrasound scans inside the transducer array. This, combined with wide band transducers, improves the resolution, signal-to-noise ratio and reduces the overlap between echoes, enabling a better segmentation of the individual tissue interfaces.The AutoFom IV also introduces methods for improving uptime (automatic failover of communication channels and servers) and securing data transmission over open networks against tampering, which is not possible in the AutoFom III. The image analysis of the AutoFom IV is to some extend inherited from the AutoFom III, and therefore the image parameter description is identical.

	AutoFom III	AutoFom IV
Slices/carcass*	850	900
Slice distance*	2.2mm	2.0mm
Scan Depth	150mm	150mm
Number of transducers	16	25
Transducer pitch	25mm	16.5mm
Transducer type	2MHz	Wide band
Digitizing stage	In server room	In array
Security measures	Physical sealing	Realtime digital authentication
Redundancy option	Manual switchover	Automatic failover
*Depends on conveyor speed		

The 13 robust parameters are explained below.

Parameters at MFT1 and MFT2 position

The MFT refers to the position of the minimum fat thickness (without skin). MFT1 refers to the minimum fat thickness in the entire carcass and MFT2 refers to the minimum fat thickness in the loin closest to the bottom of the array.

R2P10: Minimum fat thickness without skin (mm)
The minimum fat thickness without skin in the carcass (defines MFT1 position)

R3P9: Loin depth_min MFT (mm)
The loin depth at the MFT1 position

R2P8, R2P9, R3P3 and R4P6 express tissue thicknesses in the MFT2 position.

R2P8: Back fat thickness without skin (mm)

R2P9: Skin thickness (mm)

R3P3: Loin depth (mm)

R4P6: Fat layer 1 thickness (mm)

Parameters at P2 position

P2 measures are determined 70 mm from the spine in MFT2.

R2P4: Back fat thickness without skin (mm)

R2P5: Skin thickness (mm)

R3P1: Loin depth (mm)

R4P3: Fat layer 1 thickness (mm)

Other parameters

R2P1: Average Skin thickness (mm)
Average skin thickness of the entire carcass

R2P15: Minpair_value
The average fat thickness with skin of the two P2 positions.

R3P5: Maximum Loin depth (mm)
The maximum loin depth of the entire carcass

The profile is an up sampled and filtered cross-section profile. The cross-section positions are thus determined with greater precision than the inter-transducer distance. The P2 measuring position is the point 70 mm from the spine. The selected P2 point is the P2 point closest to the bottom of the array, i.e. closest to the virtual transducer #7.5 (AutoFom III) or #13 (AutoFom IV). The Minimum Fat Thickness, MFT, point refers to the minimum position of the fat profile after the skin profile has been subtracted. There is a MFT point on either side of the center (spine). The selected MFT point is the MFT in the loin closest to the bottom of the array, as in the case of the selected P2-point. Meat depth is calculated for each of the MFT and P2 positions using the rib/spine echo profile. Only the maximum meat depth, the meat depth at the selected P2/MFT positions and the average meat depth are reported in the output. The skin depth is reported at the selected MFT/P2 positions and as an overall average of the transducers with contact.

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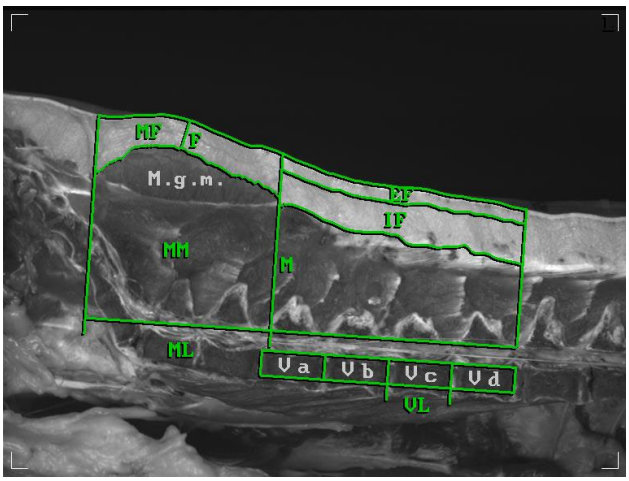
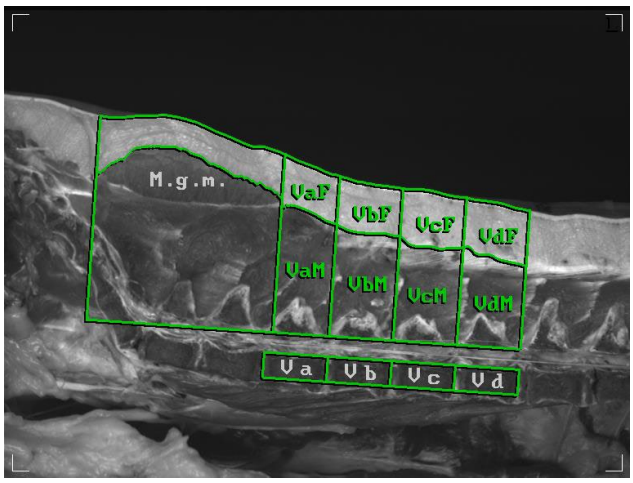
1.7 Image-Meater 2.0 and 4.0

The Image-Meater 2.0 and 4.0 (respectively left and right on the picture) are two variations based upon the same measuring principle. The 4.0 has an oblique guiding bar, a wide angle color camera and 4 straight LED lightbars, compared with the 2.0 having a straight guiding bar, a small angle black/white camera and 4 LED lightbars in a rhombus shape. Both versions take a picture from the loin area at the inner side of the left carcass half. The measuring picture does show the *musculus gluteus medius* (m.g.m.) together with the sacral and lumbar vertebrae. Both Image-Meaters also have a semi-automatic installation, for which the carcass needs to be positioned manually against the guiding bar. When pressing a button, the picture is taken and processed in the same way as the automatic version.





On the picture, 19 parameters are determined.

ZPF: ZP-Fat (bacon) thickness as thinnest layer above M.g.m.
ZPM: ZP-Meat thickness at the cranial end of M.g.m.
MF: middle fat (bacon) thickness of M.g.m.
MM: middle meat thickness of M.g.m.
VxF: middle fat (bacon) thickness above vertebra x (= a, b, c, d)
VxM: middle meat thickness above vertebra x (= a, b, c, d)
EF: middle fat thickness of the external bacon layer above the lumbar spine with vertebrae a to d
IF: middle fat thickness of the internal bacon layer above the lumbar spine with vertebrae a to d
ML: length of M.g.m.
VL: middle length of the lumbar vertebrae
RiF: rind thickness

V4F : VaF + VbF + VcF + VdF = EF + IF
V4M : VaM + VbM + VcM + VdM

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ANNEX V: MEASUREMENTS

1.1 Handheld apparatuses

NR = the number that is given to the carcass in the dataset (1-164)
AM = slaughterhouse number of the carcass
CT = CT scanning order
FOM = FOM II
OG = OptiGrade-MCP
OSTP = OptiScan-TP
OSTPC = OptiScan-TPC
ZP = ZP

NR	AM	CT	FOM_ fat	FOM_ muscle	OG_ fat	OG_ muscle	OSTP_ fat	OSTP_ muscle	OSTPC_ fat	OSTPC_ muscle	ZP_ fat	ZP_ muscle
1	1127	7	18.0	78.1	17.6	79.5	17.8	82.4	16.3	82.7	18	83
2	1271	6	10.7	72.9	10.5	73.3	6.4	84.4	6.7	86.8	5	88
3	1381	2	13.0	72.5	13.2	68.5	12.1	87.4	10.1	87.5	11	85
4	1461	1	16.2	79.6	17.1	79.9	18.0	87.0	17.4	87.0	17	86
5	1583	3	16.2	61.7	17.1	61.3	12.0	68.0	12.6	68.1	12	70
6	1811	4	11.8	69.2	14.2	71.3	13.1	74.5	12.6	76.3	12	72
7	1959	11	13.3	75.7	14.3	76.2	13.9	86.2	13.5	88.1	14	87
8	2015	10	11.8	75.5	13.6	75.6	14.6	84.3	14.0	82.7	15	87
9	2077	9	10.0	55.8	11.8	57.6	11.8	77.3	9.6	75.4	10	79
10	2381	5	24.0	58.8	25.3	63.2	17.6	75.7	17.1	75.1	17	76
11	2504	8	11.4	62.0	10.5	59.9	10.7	75.7	10.1	76.1	10	77
12	2592	19	20.6	62.9	20.7	67.2	17.6	74.1	18.8	73.5	18	77
13	2697	18	10.6	63.5	10.4	57.4	11.5	77.4	11.2	77.9	11	77
14	2790	17	13.5	74.7	14.8	78.8	13.0	80.3	12.1	81.5	12	82
15	2955	21	12.5	50.5	12.5	53.4	10.2	71.5	9.3	72.2	9	72
16	3345	14	12.7	69.6	14.2	67.8	10.3	83.2	10.1	81.5	10	81
17	3564	13	9.3	67.5	9.3	63.9	6.2	76.5	5.1	76.5	6	77
18	3634	12	13.7	76.5	13.8	72.9	15.1	82.3	13.2	83.8	14	84
19	3917	22	16.8	57.3	18.0	52.7	25.3	66.8	21.9	66.7	23	68
20	4183	20	9.0	63.3	8.6	63.2	6.9	70.8	5.3	71.9	6	72
21	4238	16	10.1	56.3	11.1	56.0	18.5	73.6	20.5	73.8	18	76
22	4350	15	8.0	50.0	7.5	49.1	6.9	70.0	7.3	70.6	5	71
23	0496	31	16.7	53.5	15.3	52.1	15.5	71.5	14.9	71.5	16	76
24	0804	30	12.4	66.7	11.3	67.2	11.5	77.6	12.1	77.7	12	78
25	1981	28	12.1	57.4	12.5	57.6	7.0	76.5	7.6	75.8	7	79
26	2031	27	14.2	75.1	15.5	75.2	11.7	88.0	9.8	89.7	10	89
27	2196	26	11.9	52.3	11.6	51.2	10.0	67.9	7.9	68.1	9	70
28	2206	25	13.2	54.4	14.3	50.7	14.4	69.8	13.2	72.2	13	74
29	2900	23	15.4	72.9	17.1	76.5	14.3	70.4	11.8	72.4	12	75
30	2986	24	20.1	55.1	21.9	58.2	19.9	71.6	18.8	71.0	18	72
31	0028	33	8.2	60.0	9.1	56.3	7.6	74.9	5.3	75.1	5	77
32	0213	32	10.7	64.1	10.5	61.8	9.1	77.7	12.1	77.2	8	77

33	0336	43	15.8	69.8	15.3	68.0	10.5	84.1	13.5	82.2	12	88
34	0463	52	22.0	64.9	20.9	65.9	24.7	74.9	23.3	74.5	23	74
35	0607	51	11.4	62.5	11.8	62.2	13.6	73.8	14.0	75.8	15	74
36	0661	37	14.7	59.8	13.8	58.3	9.8	72.2	6.2	72.4	8	73
37	0928	36	18.2	72.6	17.3	71.4	21.5	81.3	19.4	81.1	20	82
38	0955	35	12.3	74.8	12.7	68.0	10.6	85.0	8.7	86.8	9	83
39	0999	34	13.4	71.6	13.0	69.8	15.1	80.2	14.0	79.5	14	81
40	1201	45	10.6	60.2	10.7	57.4	14.4	77.3	14.3	78.8	13	80
41	1256	44	15.6	58.7	14.3	58.9	13.2	80.1	12.9	79.9	12	81
42	1346	63	13.1	66.4	12.4	69.5	10.1	74.1	8.7	74.2	8	79
43	1483	62	12.9	65.5	12.8	64.1	16.0	71.6	16.6	72.2	16	73
44	1505	42	19.6	76.5	19.7	75.7	15.5	72.1	14.0	74.5	15	75
45	1677	61	11.5	71.0	11.3	70.8	12.8	88.6	11.8	89.3	12	91
46	1817	50	10.5	65.8	11.8	66.7	14.8	72.8	13.5	73.1	14	73
47	2038	49	11.5	57.3	11.1	55.0	9.9	74.1	9.0	73.3	9	76
48	2152	48	11.7	74.1	13.1	72.1	13.0	74.2	10.1	74.0	12	75
49	2320	47	11.1	62.6	12.1	59.2	16.3	74.1	19.1	74.0	17	78
50	2512	46	15.9	80.5	14.3	82.5	22.1	86.0	20.8	86.8	21	88
51	2576	41	13.3	81.1	11.6	79.8	12.5	93.4	12.6	92.0	12	93
52	2587	40	12.1	78.7	16.5	74.3	12.9	77.8	11.0	79.0	11	79
53	2708	39	14.4	71.0	16.2	66.8	13.2	77.3	12.6	78.8	12	79
54	2858	60	16.7	80.7	16.5	71.9	16.0	84.4	15.2	84.0	14	84
55	2912	59	9.9	75.1	10.2	70.3	11.1	83.1	10.1	83.8	10	84
56	3661	55	22.5	65.9	22.3	60.2	23.4	72.8	25.6	73.5	23	73
57	3988	69	8.0	64.3	7.6	64.5	8.4	79.2	7.3	77.2	8	81
58	4189	68	9.0	72.5	9.9	74.3	10.2	91.1	8.4	90.4	9	91
59	4390	67	9.5	61.0	9.7	52.5	11.4	74.9	10.7	73.5	10	75
60	4449	54	8.4	73.3	11.1	70.4	7.6	94.4	7.0	95.2	7	96
61	4551	53	9.9	75.5	9.9	75.2	7.9	85.5	6.2	85.0	6	86
62	4601	64	10.1	66.3	9.4	60.5	9.3	72.2	7.9	73.1	8	75
63	4911	65	22.3	60.3	21.2	56.6	26.7	72.8	27.5	72.2	24	72
64	4966	70	14.5	74.8	15.3	70.8	12.0	77.2	12.1	77.0	12	78
65	5177	66	19.7	73.8	19.8	71.4	20.2	73.8	19.9	75.8	20	75
66	5310	57	7.5	65.5	8.2	61.3	7.9	77.4	7.3	78.8	7	79
67	5393	56	12.0	45.7	12.7	45.2	12.5	60.2	12.9	61.6	12	62
68	0030	73	14.5	68.2	13.1	67.5	14.6	81.4	12.9	80.8	14	81
69	0259	72	16.9	75.7	16.5	73.4	20.6	88.1	20.5	87.9	20	88
70	0287	71	19.3	78.1	18.1	73.3	24.6	80.6	23.6	81.8	23	81
71	0411	84	15.8	69.2	14.8	72.6	15.3	82.5	16.0	82.0	14	82
72	0494	83	8.3	63.0	10.5	61.0	6.3	72.5	5.9	73.5	6	73
73	0562	96	13.8	67.4	12.8	66.7	10.8	69.3	10.7	69.7	10	70
74	0997	98	13.4	81.7	13.6	80.2	12.0	88.6	11.2	89.5	10	90
75	1073	99	18.5	81.8	17.1	78.5	16.2	74.9	15.7	75.8	15	74
76	1128	97	21.4	72.4	20.9	74.6	20.0	81.3	19.4	82.2	19	82
77	1374	105	12.9	72.7	12.8	67.2	12.6	79.3	14.6	79.0	13	79
78	1417	104	12.3	70.1	13.0	67.8	15.4	87.7	14.3	88.6	17	89
79	1590	103	11.2	76.8	11.3	71.9	13.0	83.8	12.1	84.5	13	85

80	1632	102	17.9	74.9	17.0	68.8	13.6	82.2	10.1	82.7	13	83
81	1736	101	13.8	75.1	11.7	73.7	14.8	89.8	13.2	89.7	12	91
82	1842	100	14.6	74.3	14.8	71.3	12.9	84.3	10.7	85.2	11	86
83	2184	78	8.0	46.0	7.2	44.3	8.7	62.9	9.0	65.3	9	64
84	2192	77	10.0	76.4	8.5	70.4	11.8	91.1	8.7	90.4	9	91
85	2402	76	8.2	54.5	6.9	54.7	8.4	73.6	8.7	73.5	7	74
86	2748	75	11.0	67.1	12.1	61.2	7.6	76.4	7.9	77.0	7	78
87	2894	74	12.4	66.2	11.7	69.0	13.2	79.5	12.6	80.4	12	79
88	2942	95	8.6	79.8	9.0	72.3	6.1	83.9	7.3	85.4	7	84
89	2953	89	11.0	60.1	11.7	55.9	11.5	75.8	10.7	75.6	10	76
90	3190	88	10.3	63.5	10.0	57.9	8.7	74.9	8.4	75.8	7	78
91	3334	82	10.1	69.1	9.6	65.5	6.7	83.1	8.7	84.0	7	85
92	3370	81	16.5	74.0	16.3	70.6	18.4	77.2	18.0	75.8	18	77
93	3502	80	10.1	58.1	10.0	56.7	9.4	58.9	7.6	59.4	8	59
94	3543	94	5.8	66.0	6.8	64.9	9.7	80.3	7.3	78.6	8	81
95	3640	93	11.3	64.6	9.9	61.9	10.8	80.7	9.3	79.5	10	83
96	3764	92	15.2	66.3	15.9	63.5	17.1	79.5	16.0	79.7	15	80
97	3879	91	19.0	70.3	18.5	70.7	25.6	78.1	25.6	78.6	25	88
98	3947	87	17.8	65.0	18.7	63.8	22.1	61.2	21.1	62.6	22	61
99	4052	86	16.7	73.1	14.9	73.6	17.6	85.9	18.0	86.3	17	90
100	4153	85	17.7	60.0	17.9	63.1	14.6	78.6	12.9	79.7	14	82
101	4267	79	12.1	65.8	11.3	62.9	10.0	74.6	9.0	75.8	9	75
102	4337	90	10.3	73.9	9.9	70.7	9.5	70.7	7.9	66.9	9	71
103	0018	138	15.4	64.6	13.2	66.7	16.9	76.1	18.5	76.7	17	75
104	0164	137	9.3	62.4	8.6	59.6	10.5	69.8	11.0	68.7	11	71
105	0278	136	9.0	67.2	8.9	68.1	8.3	79.1	7.3	80.4	7	83
106	0391	135	12.4	71.7	11.7	70.8	11.1	84.4	9.8	81.8	10	83
107	0424	134	21.0	70.6	19.1	72.4	14.9	93.8	13.8	94.1	14	94
108	0637	133	17.6	63.4	17.7	62.5	14.6	82.3	14.6	83.1	14	84
109	0722	132	11.5	81.8	10.5	75.0	11.7	87.0	9.0	85.9	10	85
110	0728	131	10.6	77.8	10.8	74.9	12.4	76.6	12.6	77.7	11	78
111	0841	130	9.9	69.8	10.0	67.8	8.2	81.9	8.7	81.5	7	82
112	0973	129	10.5	72.0	9.6	64.9	8.3	80.7	7.3	79.0	8	82
113	1076	128	7.6	72.4	8.3	67.4	8.4	75.3	7.0	75.4	8	76
114	1168	127	20.4	65.6	19.8	76.5	18.5	81.3	20.8	80.8	17	82
115	1171	126	14.2	66.5	14.2	63.5	12.5	75.3	10.7	75.6	11	72
116	1292	125	13.4	68.1	12.4	62.1	12.3	71.4	15.2	70.6	12	71
117	1300	124	16.9	73.3	16.2	72.7	13.8	78.1	16.0	78.8	13	79
118	1679	123	10.5	72.3	10.2	68.7	7.9	85.5	6.7	85.6	7	87
119	1732	122	15.6	69.5	14.6	67.2	15.4	73.4	15.2	73.1	15	71
120	1871	121	7.4	69.1	7.9	61.5	7.9	76.1	7.6	76.3	8	78
121	1879	111	14.2	70.4	13.2	72.0	21.1	76.8	21.1	77.7	21	78
122	1965	110	8.6	60.1	9.7	57.2	6.0	76.9	5.6	77.9	5	80
123	2135	109	17.2	71.8	17.0	64.8	18.2	82.2	18.8	83.4	18	83
124	2195	108	15.8	76.5	16.2	71.0	10.1	84.9	9.8	84.3	9	83
125	2357	107	17.9	64.9	14.6	66.5	20.7	78.2	21.3	77.9	21	80
126	2422	106	9.3	57.9	9.1	54.8	7.9	79.9	8.7	82.0	8	81

127	2567	119	22.7	77.7	19.8	77.5	22.8	90.7	21.1	92.0	22	91
128	2629	118	9.7	82.7	9.9	78.9	7.2	89.2	6.2	89.3	7	89
129	2725	116	17.2	71.2	16.2	67.5	13.8	79.5	14.3	79.9	23	81
130	2885	115	13.7	82.8	11.8	74.4	17.8	83.8	15.4	84.7	17	83
131	3115	114	9.5	56.8	9.7	56.0	9.8	70.0	10.4	71.7	9	69
132	3188	113	8.7	71.9	9.1	62.6	7.2	93.0	5.3	93.1	5	93
133	3966	112	11.2	67.6	10.8	66.8	8.6	76.4	8.1	78.3	9	79
134	4061	120	11.8	67.6	13.1	59.6	11.7	70.9	11.5	71.7	11	72
135	0030	164	16.1	64.5	13.9	63.1	14.6	85.3	15.2	85.2	14	85
136	0062	163	16.9	58.8	15.7	59.2	20.7	72.8	21.3	74.2	20	74
137	0094	162	18.8	66.6	17.9	73.7	19.1	87.2	18.5	87.7	18	87
138	0240	161	12.5	64.1	12.4	66.1	10.9	82.4	9.8	82.9	10	83
139	0407	168	19.4	75.5	18.8	67.0	9.8	77.9	10.4	78.1	9	78
140	0714	167	11.6	70.4	10.4	70.0	11.6	87.4	10.7	88.6	11	91
141	0842	155	15.9	68.3	14.3	66.2	12.1	79.0	11.5	79.9	11	80
142	1001	156	15.5	68.0	14.8	64.4	15.9	78.9	16.6	79.7	16	79
143	1078	142	15.9	73.5	13.9	74.0	11.1	77.1	11.5	78.6	11	77
144	1151	141	15.5	73.6	13.4	67.5	14.3	83.1	16.0	82.4	14	83
145	1204	140	15.2	64.9	14.1	69.4	15.5	78.1	16.6	78.1	15	80
146	1225	146	10.3	64.9	10.7	68.0	9.3	82.5	9.3	84.0	8	85
147	1345	145	13.2	73.3	12.8	65.5	14.7	77.1	14.0	74.5	14	78
148	1390	144	16.1	70.1	16.3	69.5	14.8	82.5	12.6	83.1	14	83
149	1465	166	18.1	70.3	16.9	66.2	18.9	74.6	18.8	75.1	19	78
150	1673	165	15.2	67.9	14.8	68.5	16.0	88.7	14.9	89.3	15	88
151	2271	139	15.7	66.5	13.9	61.6	10.8	83.1	11.5	83.8	11	85
152	2343	149	15.9	68.1	14.2	67.1	13.3	79.0	13.5	79.7	13	81
153	2360	148	14.9	64.9	13.9	60.2	16.7	71.9	15.2	72.4	16	72
154	2520	147	13.2	64.6	12.4	68.0	9.7	70.8	9.3	70.8	10	71
155	2618	152	10.5	74.1	9.9	70.7	14.6	76.0	14.0	77.2	14	78
156	2730	151	13.9	74.6	12.5	66.4	14.7	77.1	15.2	78.3	15	76
157	2866	160	12.6	63.1	11.6	57.7	11.6	77.7	11.2	77.9	11	78
158	2904	159	11.4	63.1	10.8	61.5	7.0	70.4	5.9	71.3	6	72
159	3109	158	12.8	76.0	11.6	69.4	14.0	77.9	14.3	75.6	14	76
160	3210	157	10.2	72.6	9.4	74.3	9.3	85.7	7.6	86.1	8	86
161	3408	143	11.9	62.7	11.3	61.8	8.4	79.1	8.7	78.3	9	79
162	3416	150	12.0	74.9	12.4	67.0	11.6	85.8	13.5	86.3	11	86
163	3709	154	13.3	74.5	18.7	63.6	13.3	82.6	11.8	83.4	12	82
164	3749	153	12.3	70.0	10.5	66.1	12.0	75.4	10.7	75.6	11	77

1.2 AutoFOM III

NR	AM	CT	R2P10	R3P9	R2P8	R3P3	R4P6	R2P4	R3P1	R4P3	R2P15	R3P5
1	1127	7	13.34	78.40	13.34	78.40	5.96	13.34	78.40	5.96	12.86	78.89
2	1271	6	4.05	71.72	5.00	71.72	5.00	5.24	74.00	5.00	4.53	76.28
3	1381	2	7.39	73.51	7.86	73.84	3.57	8.58	71.88	3.57	7.86	74.16
4	1461	1	10.72	84.76	11.20	84.76	5.96	11.20	84.76	5.96	10.48	84.92
5	1583	3	9.29	58.03	10.01	57.70	4.29	10.01	57.87	4.29	9.29	59.17
6	1811	4	7.86	65.85	7.86	65.85	2.62	7.86	65.69	2.86	7.86	70.25
7	1959	11	8.58	77.26	9.29	76.94	4.53	9.29	76.77	4.53	8.34	77.26
8	2015	10	7.15	72.05	7.15	72.05	2.62	7.15	72.05	2.62	7.39	74.82
9	2077	9	7.62	63.73	7.62	63.73	3.10	7.62	63.73	3.10	7.39	66.50
10	2381	5	14.77	67.65	14.77	67.65	4.76	14.77	67.65	4.76	15.72	69.28
11	2504	8	4.76	66.50	4.76	66.50	2.86	4.76	66.50	2.86	4.76	67.16
12	2592	19	16.20	67.81	16.68	67.65	5.24	16.68	67.65	5.24	16.91	69.44
13	2697	18	5.96	65.04	5.96	65.04	2.62	5.96	64.55	2.62	5.72	68.95
14	2790	17	7.62	78.89	7.62	78.89	2.86	7.62	77.59	2.86	7.86	79.87
15	2955	21	8.34	55.09	8.34	55.09	2.86	8.58	53.79	2.86	8.34	57.05
16	3345	14	5.48	73.19	5.48	73.19	2.38	5.48	73.19	2.38	5.48	74.33
17	3564	13	3.81	65.04	3.81	65.04	2.38	3.81	64.71	2.38	3.34	65.20
18	3634	12	7.62	66.02	7.62	66.02	3.57	7.62	65.20	3.57	8.10	74.33
19	3917	22	16.20	49.71	17.15	50.86	5.48	17.15	50.86	5.48	17.63	54.44
20	4183	20	5.48	54.77	5.48	54.77	4.05	5.48	54.77	4.05	5.48	68.79
21	4238	16	7.39	58.68	7.39	58.68	3.57	7.39	58.35	3.57	7.62	59.49
22	4350	15	4.53	49.88	6.91	47.76	2.14	6.91	46.94	1.91	6.19	55.91
23	0496	31	10.01	57.54	10.96	56.89	4.76	11.20	58.68	5.00	10.48	59.17
24	0804	30	7.15	69.93	7.15	69.93	2.62	7.15	69.93	2.62	6.91	70.58
25	1981	28	5.72	66.02	5.72	66.02	2.38	5.72	65.85	2.38	5.48	66.02
26	2031	27	7.39	77.10	7.39	77.10	2.86	7.39	77.10	2.86	7.39	81.83
27	2196	26	5.24	54.44	5.48	54.61	2.62	5.48	54.61	2.62	5.72	57.70
28	2206	25	9.05	52.32	9.29	52.49	4.05	9.29	52.49	4.05	9.29	57.05
29	2900	23	9.29	74.98	9.29	74.98	2.86	9.29	74.98	2.86	9.77	75.63
30	2986	24	14.53	59.49	14.53	59.49	6.19	15.72	61.78	6.67	14.06	62.76
31	0028	33	4.76	60.47	5.00	60.47	3.34	5.00	60.15	3.34	4.76	64.71
32	0213	32	5.24	62.43	5.24	62.43	3.81	5.24	62.59	3.81	5.24	64.71
33	0336	43	10.24	69.93	10.72	70.58	6.19	10.72	70.25	6.19	10.48	73.02
34	0463	52	18.11	70.42	19.06	69.60	7.62	19.06	69.60	7.62	18.82	70.25
35	0607	51	7.86	60.64	7.86	60.64	3.34	8.10	61.12	3.34	7.86	63.08
36	0661	37	7.39	66.34	8.10	66.02	2.86	8.34	65.69	2.86	7.62	66.50
37	0928	36	13.58	74.33	13.58	74.33	4.76	13.58	74.33	4.76	15.01	74.65
38	0955	35	5.96	74.65	6.91	74.33	3.81	7.39	73.51	4.05	6.43	74.49
39	0999	34	10.72	67.48	10.72	67.48	4.29	10.72	67.48	4.29	10.72	68.95
40	1201	45	6.19	63.41	6.19	63.41	3.10	6.19	63.41	3.10	6.43	64.55
41	1256	44	9.05	56.72	9.29	56.07	3.34	9.29	58.68	3.34	8.58	67.32
42	1346	63	6.43	68.30	6.43	68.30	2.62	6.43	68.62	2.62	6.43	70.09

43	1483	62	8.81	66.67	8.81	66.67	4.29	9.05	67.32	4.29	8.58	69.93
44	1505	42	11.44	74.65	11.44	74.65	5.00	11.44	74.65	5.00	10.96	75.47
45	1677	61	5.24	72.21	5.24	72.21	3.57	5.24	72.21	3.81	5.00	72.37
46	1817	50	5.72	70.74	5.72	70.74	2.38	6.19	70.74	2.62	5.72	74.98
47	2038	49	6.67	61.78	6.67	61.78	5.00	6.91	62.59	5.24	6.19	64.22
48	2152	48	8.81	71.07	8.81	71.07	3.57	8.81	71.07	3.57	8.34	76.61
49	2320	47	9.05	54.44	9.05	54.44	3.57	9.05	54.44	3.57	9.77	56.89
50	2512	46	12.86	82.32	12.86	82.32	5.48	12.86	82.32	5.48	12.63	83.29
51	2576	41	7.39	76.94	7.39	76.94	3.57	7.39	76.94	3.57	7.39	78.89
52	2587	40	6.43	78.89	7.39	78.73	3.57	7.39	78.73	3.57	6.67	78.89
53	2708	39	8.58	74.33	10.01	73.68	5.00	10.24	73.02	5.24	9.29	77.42
54	2858	60	10.72	79.38	11.20	78.89	5.72	11.20	78.89	5.72	10.24	81.34
55	2912	59	5.24	71.23	5.24	71.23	3.57	5.24	71.23	3.57	5.00	80.36
56	3661	55	20.01	59.01	20.49	59.01	9.77	20.49	58.84	9.77	20.01	59.49
57	3988	69	5.00	62.59	5.00	62.59	2.86	5.24	61.94	3.10	4.76	64.22
58	4189	68	4.29	74.82	5.24	74.82	4.05	5.24	74.82	4.05	4.53	78.08
59	4390	67	5.96	55.58	6.43	54.77	2.14	6.43	54.77	2.14	6.19	56.07
60	4449	54	5.00	74.16	5.24	74.33	4.29	5.24	73.68	4.29	4.76	74.33
61	4551	53	5.96	72.37	6.19	72.53	2.38	6.19	72.37	2.38	5.96	76.94
62	4601	64	5.00	59.49	5.72	59.33	4.76	5.72	59.33	4.76	5.00	60.80
63	4911	65	19.54	61.12	19.54	61.12	9.05	19.54	61.12	9.05	20.96	61.29
64	4966	70	5.96	69.60	5.96	69.60	3.10	5.96	68.95	2.86	5.72	70.09
65	5177	66	12.86	76.28	13.58	76.77	3.57	13.58	76.77	3.57	15.01	79.22
66	5310	57	3.81	60.80	4.29	60.64	3.57	4.29	60.64	3.57	3.81	62.76
67	5393	56	8.34	44.99	8.34	44.99	3.57	8.58	45.31	3.57	8.58	51.83
68	0030	73	7.86	68.95	8.58	68.62	3.34	8.58	68.13	3.34	7.86	69.11
69	0259	72	12.15	72.86	12.15	72.86	5.00	12.15	72.86	5.00	12.63	76.28
70	0287	71	12.86	77.59	13.58	77.42	4.76	13.58	77.42	4.76	12.39	80.52
71	0411	84	8.10	73.19	8.58	73.51	4.29	8.58	73.51	4.53	8.10	74.49
72	0494	83	3.34	63.57	3.34	63.57	2.14	3.34	62.92	2.14	3.34	67.48
73	0562	96	7.39	69.44	7.62	69.76	3.10	7.62	69.11	3.10	7.62	72.70
74	0997	98	6.43	77.42	6.43	77.42	3.34	6.67	77.42	3.34	6.91	87.04
75	1073	99	12.15	81.34	12.15	81.34	4.29	12.15	81.34	4.29	11.44	81.34
76	1128	97	9.77	76.77	9.77	76.77	4.29	9.77	76.77	4.29	10.01	79.06
77	1374	105	7.62	69.28	7.62	69.28	3.57	7.86	70.91	3.57	7.62	71.88
78	1417	104	9.29	71.72	9.29	71.72	5.48	9.29	72.70	5.48	9.05	74.82
79	1590	103	7.62	73.84	7.62	73.84	3.34	7.62	73.84	3.34	7.62	73.84
80	1632	102	8.81	72.53	8.81	72.53	3.10	8.81	72.37	3.10	8.58	75.63
81	1736	101	7.86	78.24	9.05	77.75	3.81	9.05	77.26	3.81	8.10	80.52
82	1842	100	9.29	75.14	9.77	74.98	5.72	9.77	74.16	5.72	9.53	77.42
83	2184	78	6.19	49.88	7.86	49.71	3.34	7.86	49.88	3.10	6.91	65.53
84	2192	77	5.00	74.00	5.72	73.84	3.10	5.72	73.51	3.10	5.24	79.54
85	2402	76	4.29	57.05	5.72	55.26	0.71	5.72	55.26	0.71	4.76	56.72
86	2748	75	5.24	64.71	5.72	64.71	2.86	5.72	63.73	2.86	5.24	67.65
87	2894	74	8.10	65.20	8.10	65.20	2.86	8.10	65.20	2.86	8.58	65.85
88	2942	95	4.05	75.63	4.53	75.14	2.62	4.53	75.14	2.62	3.81	77.59

89	2953	89	5.24	63.73	6.91	63.08	2.14	7.15	63.73	2.38	6.19	64.06
90	3190	88	5.48	58.19	5.96	58.03	3.57	5.96	58.03	3.57	5.24	63.24
91	3334	82	4.05	70.91	4.53	70.74	2.86	4.53	69.28	2.86	4.05	71.72
92	3370	81	10.72	72.86	10.72	72.86	3.57	10.72	72.86	3.57	10.48	73.84
93	3502	80	7.15	58.84	7.39	59.33	2.14	7.39	59.33	2.14	6.91	59.49
94	3543	94	3.57	66.83	3.57	66.83	2.14	3.57	67.32	2.14	3.57	68.13
95	3640	93	5.96	64.55	5.96	64.55	3.34	5.96	64.71	3.34	5.72	67.16
96	3764	92	10.96	66.83	11.44	66.67	5.24	11.44	66.67	5.24	10.24	69.60
97	3879	91	17.15	70.09	17.15	70.09	3.81	17.15	70.09	3.81	20.49	70.58
98	3947	87	13.34	67.48	14.53	66.67	3.57	14.53	66.67	3.57	14.06	67.48
99	4052	86	11.20	72.05	11.44	71.56	5.00	11.44	71.56	5.00	11.44	74.65
100	4153	85	13.34	65.04	13.34	65.04	3.81	13.34	66.02	3.81	13.58	68.13
101	4267	79	5.24	66.99	5.24	66.99	2.38	5.24	66.99	2.38	5.24	68.95
102	4337	90	4.76	68.62	4.76	68.62	3.34	4.76	67.97	3.10	5.00	70.58
103	0018	138	9.05	67.97	9.05	67.97	3.10	9.05	67.97	3.10	9.29	67.97
104	0164	137	6.67	60.15	7.39	59.98	2.86	7.39	60.15	2.86	6.67	61.45
105	0278	136	4.76	71.07	4.76	71.07	2.86	4.76	70.74	2.86	4.53	71.56
106	0391	135	5.96	68.46	6.91	68.30	3.10	6.91	68.30	3.10	6.43	72.37
107	0424	134	14.53	72.37	14.53	72.37	4.76	14.53	72.37	4.76	15.96	73.68
108	0637	133	12.86	71.07	12.86	71.07	4.29	12.86	71.07	4.29	12.39	72.21
109	0722	132	4.76	70.42	4.76	70.42	2.38	4.76	70.42	2.38	4.53	72.37
110	0728	131	5.24	69.28	5.24	69.28	3.10	5.24	68.95	3.10	5.00	71.72
111	0841	130	4.53	64.55	4.53	64.55	2.86	4.76	70.09	3.10	4.76	71.88
112	0973	129	4.53	66.34	5.00	66.18	2.86	5.00	66.67	2.86	4.53	67.81
113	1076	128	4.05	68.62	4.29	68.95	3.34	4.29	69.60	3.57	4.05	71.56
114	1168	127	13.34	72.53	14.53	71.23	5.00	14.53	71.23	5.00	15.25	77.26
115	1171	126	9.29	68.30	10.01	68.13	4.29	10.01	68.30	4.29	9.05	69.28
116	1292	125	10.72	65.20	11.20	65.36	3.57	11.20	65.36	3.57	10.72	65.36
117	1300	124	10.48	69.11	12.15	69.60	5.24	12.15	69.11	5.24	11.44	72.05
118	1679	123	5.48	68.62	5.72	68.62	3.10	5.72	70.91	3.10	5.48	70.91
119	1732	122	11.67	68.79	11.91	68.95	4.05	11.91	68.95	4.05	11.91	68.95
120	1871	121	4.29	63.90	4.29	63.90	2.38	4.53	65.20	2.38	4.29	68.46
121	1879	111	10.01	73.02	10.01	73.02	4.76	10.01	72.86	5.00	10.24	73.68
122	1965	110	4.76	60.80	5.24	60.80	2.38	5.24	60.80	2.38	5.00	60.80
123	2135	109	11.67	67.48	11.67	67.48	5.24	11.67	68.79	5.24	11.20	74.65
124	2195	108	8.10	79.38	8.81	79.38	3.10	8.81	79.38	3.10	8.34	79.71
125	2357	107	10.96	65.36	11.44	65.04	4.76	11.44	65.04	4.76	11.44	65.53
126	2422	106	4.76	57.05	4.76	57.05	3.10	4.76	57.05	3.10	4.53	58.19
127	2567	119	19.54	79.38	19.54	79.38	5.72	19.54	79.38	5.72	22.63	83.78
128	2629	118	4.76	76.28	4.76	76.28	2.86	4.76	77.42	2.86	4.53	80.85
129	2725	116	11.91	71.56	11.91	71.56	4.76	11.91	71.56	4.76	12.15	72.37
130	2885	115	9.05	67.48	10.24	66.99	4.76	10.48	67.32	5.00	9.29	69.28
131	3115	114	7.62	56.72	7.62	56.72	3.34	7.62	56.56	3.34	7.39	57.54
132	3188	113	4.29	63.90	4.53	63.73	3.10	4.53	63.73	3.10	4.29	66.34
133	3966	112	6.91	64.71	6.91	64.71	3.10	6.91	64.87	3.10	6.67	65.04
134	4061	120	7.15	59.82	7.15	59.82	2.62	7.15	59.82	2.62	7.39	61.78

135	0030	164	11.91	67.16	11.91	67.16	4.29	11.91	67.16	4.29	12.63	68.62
136	0062	163	13.58	59.49	13.82	58.84	4.53	13.82	58.19	4.53	13.82	60.31
137	0094	162	12.15	70.42	14.06	69.28	6.67	14.06	69.28	6.67	13.58	70.42
138	0240	161	7.86	65.20	8.34	65.20	3.57	8.34	65.04	3.57	7.86	66.50
139	0407	168	8.81	70.91	9.77	70.74	4.53	9.77	70.25	4.53	10.24	72.86
140	0714	167	6.19	68.30	6.19	68.30	2.62	6.19	69.76	2.62	7.15	71.72
141	0842	155	8.58	65.36	8.58	65.36	3.57	8.58	65.69	3.57	8.34	71.72
142	1001	156	9.05	71.88	9.77	71.72	4.76	9.77	71.23	4.76	9.53	71.72
143	1078	142	9.29	70.58	9.53	70.58	3.81	9.53	70.58	3.81	9.05	71.88
144	1151	141	8.58	69.11	9.29	68.46	4.53	9.29	68.13	4.53	8.58	69.28
145	1204	140	8.34	66.34	8.34	66.34	5.96	8.34	66.34	5.96	8.10	70.42
146	1225	146	6.19	68.13	6.19	68.13	3.34	6.19	68.30	3.34	5.96	68.30
147	1345	145	7.86	62.92	7.86	62.92	2.86	7.86	62.92	2.86	8.10	65.36
148	1390	144	9.53	69.60	9.53	69.60	3.57	9.53	69.60	3.57	9.29	72.86
149	1465	166	12.15	68.62	13.34	67.81	4.53	13.34	67.81	4.53	12.39	68.46
150	1673	165	8.81	68.62	9.29	69.44	3.81	9.29	69.28	3.81	9.29	71.56
151	2271	139	8.58	62.27	9.53	61.61	3.57	9.53	61.61	3.57	8.81	62.10
152	2343	149	9.05	63.90	9.29	64.06	3.81	9.29	64.06	3.81	8.58	65.53
153	2360	148	8.34	61.12	9.05	61.12	4.05	9.05	60.64	4.05	9.05	63.57
154	2520	147	7.15	66.50	7.15	66.50	3.10	7.15	67.16	2.86	7.39	69.93
155	2618	152	6.67	64.55	6.91	64.71	3.10	6.91	63.41	3.10	6.91	69.76
156	2730	151	8.81	62.92	9.05	62.59	2.86	9.05	63.08	2.86	9.05	64.55
157	2866	160	8.10	64.87	8.34	65.20	2.86	8.34	65.04	2.86	7.86	65.20
158	2904	159	6.19	66.18	6.19	66.18	4.76	6.43	65.85	5.00	6.67	70.58
159	3109	158	7.62	65.85	7.86	65.85	3.81	7.86	66.50	3.81	7.39	67.32
160	3210	157	6.19	66.02	6.19	66.02	3.34	6.19	65.85	3.34	6.43	67.97
161	3408	143	6.67	67.32	6.91	67.48	2.86	6.91	67.48	2.86	6.43	68.79
162	3416	150	6.67	69.44	7.15	69.11	4.29	7.15	69.28	4.29	7.15	73.35
163	3709	154	7.39	69.44	7.62	69.44	3.10	7.62	69.11	3.10	7.15	72.21
164	3749	153	6.43	68.30	7.15	68.13	2.62	7.15	68.13	2.62	6.67	68.62

1.3 AutoFOM IV

NR	AM	CT	R2P10_ AF4	R3P9_ AF4	R2P8_ AF4	R3P3_ AF4	R4P6_ AF4	R2P4_ AF4	R3P1_ AF4	R4P3_ AF4	R2P15_ AF4	R3P5_ AF4
1	1127	7	15.01	79.30	15.13	79.46	5.48	15.13	79.46	5.48	14.29	80.03
2	1271	6	4.41	72.45	4.53	71.07	3.45	5.12	78.73	4.53	4.65	81.26
3	1381	2	8.58	76.45	9.17	76.28	3.81	9.17	76.28	3.81	7.62	76.53
4	1461	1	12.03	84.43	12.03	84.43	5.96	12.03	84.43	5.96	11.79	85.09
5	1583	3	10.24	61.61	10.24	61.61	4.41	10.24	61.61	4.41	10.01	62.35
6	1811	4	7.62	71.80	7.62	71.80	5.84	7.62	71.48	5.72	6.79	72.45
7	1959	11	8.81	78.00	9.41	77.42	5.00	9.41	77.42	5.00	8.34	77.42
8	2015	10	7.86	73.27	7.86	73.27	3.34	7.86	73.11	3.45	7.15	75.63
9	2077	9	8.22	67.40	8.34	67.48	3.57	8.34	66.99	3.69	7.03	69.19
10	2381	5	15.96	71.56	15.96	71.56	5.12	15.96	71.72	5.12	15.01	72.78
11	2504	8	5.36	67.40	5.36	67.40	3.10	5.36	67.24	3.10	5.12	67.65
12	2592	19	16.91	71.80	16.91	71.80	5.48	16.91	71.80	5.48	16.56	72.45
13	2697	18	6.55	67.73	6.55	67.73	2.62	6.55	67.73	2.62	5.96	70.58
14	2790	17	7.50	80.93	7.74	80.85	4.29	7.74	80.44	4.53	6.79	81.34
15	2955	21	8.58	58.27	8.70	57.70	4.88	9.05	59.74	5.12	7.50	60.64
16	3345	14	6.55	73.35	6.55	73.35	4.29	6.67	74.33	4.53	6.19	75.55
17	3564	13	4.41	64.22	4.41	64.22	3.10	4.41	64.06	3.10	4.17	68.38
18	3634	12	9.65	71.39	9.65	70.58	4.05	9.65	70.58	4.05	8.22	71.31
19	3917	22	18.11	50.86	18.11	50.86	6.07	18.11	50.61	6.07	17.75	52.81
20	4183	20	4.88	57.46	4.88	57.46	4.65	5.24	49.63	4.29	5.12	68.95
21	4238	16	7.86	60.31	7.86	60.31	4.29	7.86	60.39	4.29	6.67	60.88
22	4350	15	4.53	55.09	4.53	55.09	3.93	5.12	53.06	3.93	5.60	60.55
23	0496	31	11.08	56.89	11.44	56.56	5.12	11.67	60.07	5.24	10.48	60.31
24	0804	30	7.74	71.72	8.93	70.99	4.05	8.93	70.91	3.93	7.50	72.21
25	1981	28	6.07	66.42	6.91	65.77	3.45	6.91	65.69	3.45	5.96	72.45
26	2031	27	7.74	74.16	8.58	71.23	4.17	8.58	78.00	3.57	7.74	82.48
27	2196	26	6.67	54.77	6.67	54.77	4.17	6.67	55.01	4.17	6.31	64.22
28	2206	25	9.53	52.24	10.24	52.00	4.17	10.24	51.92	4.17	8.93	58.84
29	2900	23	9.77	75.63	10.24	75.22	3.10	10.24	75.06	3.10	9.05	76.28
30	2986	24	15.96	62.51	16.08	61.29	7.03	16.91	62.35	7.39	15.37	64.22
31	0028	33	4.65	61.12	5.36	61.61	2.62	5.36	61.78	2.74	4.65	69.19
32	0213	32	5.24	62.51	5.24	62.51	4.41	5.84	61.29	3.81	5.48	67.32
33	0336	43	10.72	69.76	10.72	69.76	6.55	10.72	70.33	6.43	10.36	74.49
34	0463	52	19.54	71.88	20.61	70.25	7.39	20.61	70.25	7.39	20.49	72.53
35	0607	51	7.86	62.35	7.86	62.35	3.34	8.22	61.37	3.45	7.39	63.33
36	0661	37	7.62	67.40	7.74	67.32	2.86	8.22	64.79	2.98	7.15	68.13
37	0928	36	13.82	74.49	13.94	75.22	4.76	15.01	71.88	4.76	12.98	77.34
38	0955	35	7.39	77.67	7.74	76.94	3.81	7.74	76.69	3.81	7.15	76.94
39	0999	34	10.48	70.33	10.48	70.33	3.93	10.48	70.25	3.81	10.24	75.55
40	1201	45	7.15	65.77	7.15	65.77	4.05	7.15	65.69	4.05	6.67	66.91
41	1256	44	9.17	65.61	9.17	65.61	3.22	9.41	65.93	3.34	8.46	68.13
42	1346	63	6.67	70.17	6.67	70.17	2.02	6.91	70.09	1.91	5.96	70.74
43	1483	62	9.89	68.30	9.89	68.05	4.76	10.01	68.22	4.76	9.05	69.44

44	1505	42	12.27	77.18	12.27	77.18	4.76	12.27	77.18	4.76	11.55	78.57
45	1677	61	6.91	71.80	6.91	71.80	4.88	7.27	68.30	4.76	6.79	74.25
46	1817	50	6.55	74.00	7.03	73.68	4.53	7.03	73.68	4.53	6.07	74.65
47	2038	49	6.91	61.37	7.03	61.78	4.29	7.98	62.27	4.88	6.91	69.60
48	2152	48	9.05	77.75	9.53	77.18	3.34	9.53	77.18	3.34	8.22	78.40
49	2320	47	9.89	59.98	9.89	59.98	4.88	9.89	59.98	4.88	9.17	65.12
50	2512	46	13.46	85.00	13.46	85.00	5.72	13.70	84.11	5.72	13.10	85.17
51	2576	41	8.10	84.35	8.10	84.35	3.93	8.10	84.52	3.93	7.86	85.25
52	2587	40	7.62	80.20	8.46	79.63	3.69	8.46	79.63	3.69	7.27	79.71
53	2708	39	10.24	74.41	10.48	73.59	5.12	11.32	75.39	5.60	9.65	77.10
54	2858	60	10.96	81.09	11.55	80.28	5.72	11.55	80.28	5.72	10.60	81.42
55	2912	59	5.36	73.51	5.36	73.51	3.81	5.36	73.02	3.93	5.12	79.63
56	3661	55	18.58	60.64	18.58	62.02	10.60	18.70	62.92	10.48	19.30	67.81
57	3988	69	4.65	62.43	4.65	62.43	3.34	4.65	62.02	3.34	4.41	64.55
58	4189	68	5.48	76.04	5.48	76.04	4.05	5.48	76.04	4.05	5.24	76.28
59	4390	67	7.86	54.93	7.86	55.42	9.53	7.98	53.63	9.53	7.98	57.13
60	4449	54	5.12	74.00	5.48	73.92	3.45	5.48	74.00	3.45	4.88	76.20
61	4551	53	6.91	74.98	7.03	74.98	2.74	7.03	74.98	2.74	6.31	76.28
62	4601	64	4.76	62.67	4.88	62.51	3.81	4.88	62.51	3.81	4.41	68.70
63	4911	65	21.92	59.98	21.92	58.76	9.29	21.92	58.68	9.29	21.92	60.55
64	4966	70	6.67	70.82	6.67	70.82	5.12	6.91	70.82	5.24	6.31	72.21
65	5177	66	13.70	75.55	14.89	77.18	4.05	15.60	77.42	4.05	13.82	77.42
66	5310	57	4.29	63.73	4.29	63.73	3.10	4.29	64.47	3.10	5.36	88.92
67	5393	56	9.05	44.83	9.05	44.83	3.93	9.17	44.91	3.81	8.58	53.71
68	0030	73	8.58	70.42	9.29	69.93	3.45	9.29	69.60	3.45	7.74	70.25
69	0259	72	13.22	75.14	13.22	75.14	5.00	13.22	75.14	5.00	13.70	76.61
70	0287	71	13.22	78.32	13.58	77.59	4.76	13.58	77.59	4.76	12.39	78.65
71	0411	84	9.41	74.00	9.41	74.00	4.76	9.41	74.25	4.76	8.58	75.14
72	0494	83	3.81	67.48	3.93	67.48	2.62	3.93	67.32	2.62	3.69	68.46
73	0562	96	7.50	72.21	7.50	72.21	4.05	8.58	70.42	4.65	7.74	74.82
74	0997	98	7.39	77.34	7.74	77.26	4.17	7.74	77.02	4.29	7.39	85.49
75	1073	99	12.63	81.66	12.63	81.66	4.76	12.63	81.66	4.76	11.55	81.83
76	1128	97	10.84	79.38	11.20	78.16	4.41	11.20	78.16	4.41	10.84	82.07
77	1374	105	8.22	70.74	8.46	70.66	3.81	8.46	70.09	4.17	7.15	71.96
78	1417	104	10.36	74.65	10.36	74.65	4.65	10.36	74.98	4.65	9.77	76.94
79	1590	103	8.22	75.96	8.34	75.71	3.45	8.34	75.14	3.45	7.50	76.53
80	1632	102	9.17	58.52	9.29	60.80	3.34	10.12	70.01	3.22	10.01	78.24
81	1736	101	8.81	82.32	9.65	81.83	4.41	9.65	81.83	4.41	8.34	82.72
82	1842	100	10.12	76.69	10.24	76.28	5.72	10.24	76.28	5.72	9.77	76.94
83	2184	78	5.36	51.67	5.36	51.67	2.86	6.55	54.77	2.02	4.76	54.77
84	2192	77	6.07	77.59	6.07	77.51	2.74	6.07	77.51	2.74	5.36	77.75
85	2402	76	5.24	58.84	5.24	58.84	3.34	5.60	55.91	3.93	5.36	59.90
86	2748	75	6.79	67.48	6.79	67.48	3.45	7.03	64.06	3.57	6.31	68.30
87	2894	74	8.70	67.97	8.81	68.13	3.10	8.81	68.13	3.10	7.86	69.52
88	2942	95	5.72	79.95	5.96	79.87	3.93	5.96	80.11	4.05	5.60	81.26
89	2953	89	7.62	64.87	7.62	64.87	5.84	7.62	64.79	5.84	7.27	65.12

90	3190	88	5.00	60.72	5.00	60.72	3.93	5.00	60.64	3.93	5.00	63.98
91	3334	82	5.24	70.99	5.24	70.99	3.45	5.24	71.31	3.45	6.67	73.68
92	3370	81	11.91	74.90	12.39	76.20	9.17	12.39	76.37	8.81	11.91	81.91
93	3502	80	7.15	57.78	7.15	57.87	5.12	7.15	57.62	5.12	6.55	65.04
94	3543	94	4.05	67.16	4.05	67.16	2.74	4.05	66.10	2.86	4.17	73.11
95	3640	93	6.19	66.42	6.19	67.32	4.88	6.31	67.32	5.12	6.07	73.11
96	3764	92	13.22	63.08	13.22	62.76	5.60	13.22	61.94	5.60	12.27	68.95
97	3879	91	18.22	71.88	18.22	71.88	4.76	18.22	71.88	4.76	20.13	73.11
98	3947	87	13.94	67.48	15.01	66.91	4.05	15.01	66.75	4.05	13.58	67.24
99	4052	86	11.91	75.47	11.91	75.47	5.96	11.91	75.47	5.96	11.55	76.85
100	4153	85	13.70	68.22	13.70	68.22	3.69	13.70	68.54	3.69	12.39	71.80
101	4267	79	5.84	67.89	5.84	67.89	3.45	5.84	66.99	3.45	5.36	68.79
102	4337	90	3.69	71.23	4.17	70.99	2.50	4.17	70.99	2.50	3.34	71.64
103	0018	138	10.36	70.99	10.36	70.74	3.45	10.36	70.42	3.34	9.89	71.72
104	0164	137	7.39	64.14	7.39	64.14	4.53	7.39	63.90	4.53	6.67	64.96
105	0278	136	5.12	72.78	5.12	72.78	4.29	5.12	71.56	4.41	4.76	78.16
106	0391	135	7.27	70.74	7.50	70.74	3.69	7.50	70.25	3.69	6.91	74.49
107	0424	134	15.96	75.14	15.96	75.14	5.36	15.96	75.14	5.36	15.49	80.20
108	0637	133	13.58	70.74	13.58	70.74	4.53	13.58	70.74	4.53	13.10	71.23
109	0722	132	5.96	72.45	5.96	72.45	4.17	5.96	72.29	4.29	5.24	73.27
110	0728	131	6.19	72.45	6.19	72.45	3.22	6.19	71.96	3.22	5.60	75.80
111	0841	130	5.48	70.66	5.48	70.66	3.45	5.48	70.82	3.45	5.24	73.92
112	0973	129	5.24	66.99	5.24	66.99	3.69	5.24	66.99	3.69	4.76	67.32
113	1076	128	4.65	72.53	5.12	73.11	4.76	5.12	73.11	4.76	4.17	74.41
114	1168	127	15.13	77.83	17.03	77.18	5.48	17.03	77.18	5.48	14.89	77.34
115	1171	126	9.89	69.28	10.84	68.95	4.65	10.84	68.95	4.65	9.17	69.36
116	1292	125	11.67	67.56	11.79	67.81	3.22	11.79	67.97	3.22	10.60	68.54
117	1300	124	12.03	72.21	13.58	71.31	5.84	13.58	71.23	5.96	12.03	71.31
118	1679	123	5.60	71.23	5.60	71.23	3.22	5.60	71.64	3.22	5.48	72.05
119	1732	122	12.03	68.38	12.03	68.38	4.17	12.03	68.38	4.17	11.32	69.52
120	1871	121	5.84	66.50	6.31	66.67	5.84	6.31	65.61	5.84	5.12	70.42
121	1879	111	11.44	75.39	11.44	75.39	5.00	11.44	75.14	5.00	10.72	75.88
122	1965	110	5.00	61.37	5.00	61.37	3.81	5.00	61.37	3.81	5.12	61.78
123	2135	109	12.39	72.21	12.39	72.21	5.36	12.39	70.99	5.36	11.44	72.62
124	2195	108	7.27	75.88	7.74	75.55	5.12	9.05	71.15	6.79	8.10	78.89
125	2357	107	11.79	68.79	13.10	68.22	5.12	13.10	68.05	5.12	12.03	70.33
126	2422	106	4.65	60.47	4.65	60.47	3.57	4.65	60.64	3.57	4.41	60.80
127	2567	119	20.85	84.03	21.44	83.54	6.07	21.44	83.54	6.07	21.44	83.78
128	2629	118	4.88	78.24	4.88	78.24	2.98	4.88	78.24	2.98	4.41	79.14
129	2725	116	13.10	71.23	13.10	71.23	4.88	13.10	71.31	4.88	12.39	74.74
130	2885	115	10.60	70.74	10.60	70.58	5.12	10.60	70.42	5.24	9.65	72.05
131	3115	114	7.27	55.50	7.27	55.50	3.81	7.27	55.75	3.81	7.15	59.33
132	3188	113	4.53	68.05	4.76	67.97	3.45	4.76	67.89	3.45	4.41	74.82
133	3966	112	14.17	71.72	14.17	71.72	5.84	14.17	71.80	5.84	13.22	72.86
134	4061	120	8.10	59.98	8.10	59.98	2.86	8.10	59.98	2.86	7.15	62.59
135	0030	164	13.82	70.01	13.94	70.50	4.41	13.94	70.50	4.41	12.98	70.99

136	0062	163	14.41	60.15	15.13	59.98	5.12	15.13	59.33	5.12	13.70	61.04
137	0094	162	14.17	71.96	15.25	71.39	6.67	15.25	71.39	6.67	15.13	74.90
138	0240	161	7.98	65.20	8.93	64.79	3.69	8.93	64.63	3.69	7.62	66.18
139	0407	168	9.89	71.96	10.24	70.91	7.03	10.24	71.07	7.03	10.01	73.02
140	0714	167	6.43	72.37	6.43	72.37	2.62	6.43	72.53	2.62	5.84	73.76
141	0842	155	8.93	66.02	8.93	66.02	4.05	9.05	67.40	4.05	8.10	72.70
142	1001	156	10.48	72.94	10.72	72.62	5.72	10.72	72.53	5.72	9.89	72.70
143	1078	142	9.77	71.48	10.12	70.99	4.53	10.12	71.07	4.53	9.41	71.15
144	1151	141	9.53	71.39	10.12	70.25	5.48	10.12	69.93	5.48	9.41	74.16
145	1204	140	9.53	70.50	9.53	70.50	6.31	9.53	70.66	6.19	9.41	71.07
146	1225	146	6.55	70.66	6.79	70.58	4.76	6.79	68.70	4.76	6.19	74.25
147	1345	145	8.81	66.18	8.81	66.02	3.57	8.81	66.02	3.57	7.98	68.62
148	1390	144	10.84	68.62	10.84	68.62	4.05	10.84	68.87	4.05	9.29	73.35
149	1465	166	13.94	69.36	14.53	69.11	4.88	14.53	69.03	4.88	13.46	69.85
150	1673	165	9.53	70.99	9.89	71.31	4.41	9.89	71.31	4.41	8.70	72.53
151	2271	139	9.05	59.82	10.01	60.07	3.69	10.01	59.25	3.69	8.34	62.84
152	2343	149	9.53	71.72	10.36	71.80	4.88	10.36	70.82	4.88	8.93	72.70
153	2360	148	8.70	63.98	9.17	63.65	4.41	9.17	63.57	4.41	8.10	63.81
154	2520	147	7.39	69.68	7.39	69.68	3.10	7.39	69.68	3.10	7.15	83.46
155	2618	152	7.50	66.50	7.50	66.42	3.34	7.50	65.44	3.34	6.43	69.76
156	2730	151	9.77	65.36	9.89	64.96	3.22	10.01	65.93	3.22	8.46	65.93
157	2866	160	8.34	64.79	8.34	64.79	3.10	8.34	64.87	3.10	7.27	66.42
158	2904	159	6.31	66.42	6.31	66.42	4.41	6.91	65.61	4.65	5.96	69.36
159	3109	158	8.70	67.48	8.81	67.24	3.69	8.81	66.99	3.69	8.22	69.19
160	3210	157	4.88	67.97	4.88	67.97	3.10	4.88	67.65	3.10	4.05	71.39
161	3408	143	7.27	65.93	7.27	65.93	3.45	7.27	66.59	3.45	6.79	68.13
162	3416	150	7.62	71.80	7.62	71.80	4.76	7.74	71.31	4.76	7.39	72.53
163	3709	154	7.86	69.68	7.86	69.68	2.98	7.86	69.52	2.98	7.03	70.50
164	3749	153	6.31	66.67	7.03	66.26	5.48	7.03	66.26	5.48	5.84	70.58

1.4 Image-Meater 2.0

NR	AM	CT	ZPF	ZPM	ML	MF	MM	VL	V4F	V4M
1	1127	7	18.4	88.1	119.5	22.1	109.0	42.6	32.7	61.9
2	1271	6	9.0	99.5	84.6	11.2	112.7	39.1	20.5	78.4
3	1381	2	12.8	88.6	121.0	15.2	114.7	44.2	26.1	66.9
4	1461	1	19.6	80.2	117.2	25.1	110.0	41.1	34.9	69.3
5	1583	3	13.4	77.8	91.7	15.6	96.9	39.6	25.2	54.0
6	1811	4	13.7	81.9	83.0	17.3	100.2	39.5	27.2	62.4
7	1959	11	15.7	95.7	88.8	18.7	111.6	43.7	31.9	65.3
8	2015	10	13.5	94.9	114.8	19.6	121.6	38.1	24.2	74.3
9	2077	9	11.6	85.1	57.4	13.2	94.9	41.7	21.7	62.1
10	2381	5	19.4	84.1	106.8	22.1	107.0	42.0	35.5	61.1
11	2504	8	10.8	80.4	125.5	13.3	99.3	44.3	24.0	59.5
12	2592	19	19.9	86.9	115.6	23.8	95.7	40.3	27.7	63.8
13	2697	18	14.4	90.7	98.5	16.7	112.7	40.6	28.2	69.8
14	2790	17	13.9	90.1	75.5	17.1	111.2	39.6	23.7	71.2
15	2955	21	12.9	75.7	97.7	16.8	96.5	42.2	25.0	55.8
16	3345	14	13.0	88.5	105.4	16.2	104.5	44.5	21.7	68.5
17	3564	13	5.9	86.0	109.9	8.7	112.4	42.7	19.7	61.0
18	3634	12	16.3	86.9	89.9	19.0	100.7	40.5	29.5	68.2
19	3917	22	25.4	75.7	117.2	30.6	106.1	41.7	33.9	55.0
20	4183	20	7.2	80.9	90.0	9.9	102.8	39.6	20.2	60.2
21	4238	16	20.5	87.1	62.0	24.0	102.1	42.2	30.3	65.3
22	4350	15	8.4	78.2	135.0	10.2	101.4	41.1	20.8	54.3
23	0496	31	18.1	77.9	106.2	19.7	93.9	43.3	27.0	58.2
24	0804	30	11.3	76.9	79.2	14.9	87.4	42.2	21.4	57.4
25	1981	28	9.4	88.7	105.8	12.1	111.6	39.6	21.3	62.9
26	2031	27	9.7	93.9	125.4	12.8	112.3	41.7	28.1	67.4
27	2196	26	9.8	74.7	92.6	11.4	94.9	44.8	21.0	52.8
28	2206	25	12.5	77.2	110.3	16.6	99.9	42.7	28.3	57.3
29	2900	23	14.4	85.5	79.2	16.6	98.3	41.7	27.9	60.7
30	2986	24	18.1	75.4	92.4	21.0	90.9	41.7	28.2	52.3
31	0028	33	6.6	86.5	102.3	8.2	112.2	43.2	16.3	64.6
32	0213	32	11.9	84.2	89.3	15.4	100.7	41.8	25.0	62.1
33	0336	43	13.3	88.2	115.3	16.1	113.8	42.8	31.1	61.9
34	0463	52	26.9	83.8	103.0	32.8	104.2	40.3	36.5	66.9
35	0607	51	16.9	71.1	77.6	18.2	85.2	41.2	21.6	58.3
36	0661	37	9.5	79.5	94.9	12.8	100.6	39.1	26.2	53.7
37	0928	36	23.0	89.4	73.7	25.9	104.5	43.4	34.4	64.2
38	0955	35	8.9	94.4	105.2	12.0	112.6	40.9	25.3	69.3
39	0999	34	15.5	82.9	97.4	19.5	101.6	39.8	25.7	63.1
40	1201	45	15.0	77.3	111.6	18.6	97.4	42.0	28.0	57.8
41	1256	44	12.6	85.6	127.2	15.2	106.2	50.8	26.1	63.4
42	1346	63	10.0	80.2	112.6	12.2	104.2	44.2	25.1	56.0
43	1483	62	17.2	73.4	95.0	20.6	92.0	41.3	24.7	60.4

44	1505	42	18.0	75.6	98.9	22.2	100.5	40.3	32.2	57.4
45	1677	61	13.3	94.7	115.9	15.0	116.0	41.1	25.6	68.7
46	1817	50	15.8	83.6	82.2	18.0	105.1	39.4	27.5	61.3
47	2038	49	7.5	84.9	84.5	11.7	105.1	41.6	24.0	57.7
48	2152	48	14.5	79.2	93.8	18.5	96.4	40.7	27.2	65.3
49	2320	47	19.1	78.1	100.6	21.5	92.0	44.5	30.0	58.7
50	2512	46	22.7	92.8	80.2	26.3	108.2	40.1	33.5	73.4
51	2576	41	13.9	99.6	92.6	15.6	115.6	41.4	28.7	69.1
52	2587	40	13.4	86.1	69.1	16.5	102.0	42.2	23.8	66.5
53	2708	39	14.4	86.5	96.3	18.4	106.9	38.3	31.2	61.6
54	2858	60	15.3	88.2	116.5	19.6	110.2	44.3	34.7	61.0
55	2912	59	13.9	88.0	108.9	17.0	106.0	41.6	23.1	61.1
56	3661	55	27.3	81.5	74.6	28.9	91.4	41.7	33.8	64.9
57	3988	69	8.6	83.5	89.5	11.9	107.5	42.2	22.5	58.8
58	4189	68	9.1	108.8	81.2	13.4	125.9	42.9	22.5	76.1
59	4390	67	11.0	81.2	115.5	13.4	106.9	46.5	26.3	60.0
60	4449	54	9.3	101.0	90.4	10.1	119.1	44.3	20.0	71.7
61	4551	53	6.9	91.2	99.0	11.1	113.3	47.1	24.1	68.7
62	4601	64	10.9	73.8	90.9	13.4	88.1	40.7	18.1	60.3
63	4911	65	28.7	75.9	99.4	33.8	94.9	45.9	36.5	55.7
64	4966	70	13.0	86.7	95.0	15.1	101.8	43.3	26.3	63.4
65	5177	66	22.0	84.9	93.2	27.0	101.1	38.8	32.3	64.2
66	5310	57	7.9	81.7	111.2	9.4	110.1	41.3	16.8	60.6
67	5393	56	14.7	63.3	119.3	18.2	87.2	42.2	21.0	46.9
68	0030	73	15.1	94.7	65.6	17.6	108.4	42.4	22.9	69.2
69	0259	72	22.2	96.5	88.0	25.4	115.7	43.6	30.4	74.1
70	0287	71	24.7	91.1	74.7	28.4	104.6	43.9	38.2	62.1
71	0411	84	16.0	90.7	109.5	20.9	107.9	41.7	27.9	61.6
72	0494	83	7.9	85.0	91.0	10.3	111.6	41.1	19.0	63.5
73	0562	96	12.2	71.0	94.5	16.6	91.6	44.2	20.4	64.8
74	0997	98	11.2	93.2	79.2	14.0	111.0	41.1	26.8	67.6
75	1073	99	18.1	79.2	117.7	22.7	99.4	40.1	32.8	62.3
76	1128	97	22.0	81.6	86.7	27.6	91.2	38.7	31.5	63.9
77	1374	105	15.3	84.8	80.1	20.6	101.6	42.4	27.7	62.6
78	1417	104	15.8	94.5	98.6	19.1	117.6	40.2	31.2	69.6
79	1590	103	14.9	93.8	98.2	18.0	111.5	45.9	31.1	66.5
80	1632	102	12.5	93.2	72.2	15.8	109.4	43.5	25.7	69.3
81	1736	101	17.5	91.6	100.6	20.4	106.7	43.9	28.9	67.5
82	1842	100	13.7	90.4	96.9	17.3	113.3	43.9	29.5	64.4
83	2184	78	11.3	68.0	97.5	14.0	88.9	40.2	17.9	50.8
84	2192	77	11.6	97.4	87.7	14.2	120.9	42.7	28.2	71.7
85	2402	76	9.7	85.1	103.6	11.1	98.9	42.3	20.4	64.1
86	2748	75	8.5	81.6	116.7	11.4	106.7	39.2	25.0	60.3
87	2894	74	13.3	76.9	119.0	15.6	105.3	42.3	26.0	55.5
88	2942	95	9.8	91.2	101.5	11.5	109.8	42.5	16.1	70.8
89	2953	89	11.1	82.1	103.2	14.1	103.5	40.2	22.4	56.7

90	3190	88	6.1	79.3	80.9	9.9	101.0	43.7	19.0	59.1
91	3334	82	6.1	86.8	92.8	8.4	102.8	42.3	20.7	62.0
92	3370	81	19.6	80.6	77.7	22.5	95.0	45.4	32.2	59.4
93	3502	80	10.0	59.0	101.0	12.2	83.1	40.3	22.8	47.4
94	3543	94	9.5	87.4	93.9	11.0	103.5	41.6	20.5	65.3
95	3640	93	11.4	88.8	99.5	13.5	106.6	38.6	22.2	66.0
96	3764	92	16.7	88.1	114.7	20.3	110.3	42.7	30.4	59.7
97	3879	91	27.5	81.5	73.5	30.1	92.1	40.4	31.9	67.6
98	3947	87	23.5	66.0	110.2	26.9	82.0	41.0	30.0	55.3
99	4052	86	18.1	93.4	115.9	21.2	115.0	42.8	30.0	70.7
100	4153	85	15.1	80.6	101.3	18.9	100.0	40.8	28.5	62.5
101	4267	79	10.3	79.4	74.1	11.5	90.5	43.3	23.2	58.7
102	4337	90	8.5	76.2	105.0	11.7	100.7	41.5	26.9	56.0
103	0018	138	19.4	83.4	83.5	21.2	93.8	38.2	26.2	67.9
104	0164	137	12.6	73.2	110.6	14.6	89.5	45.6	24.6	56.2
105	0278	136	9.3	91.9	107.1	12.0	107.6	38.6	20.9	71.4
106	0391	135	10.9	90.3	107.8	14.7	112.6	41.8	24.9	65.8
107	0424	134	14.9	101.1	103.0	18.3	121.7	41.7	27.3	81.8
108	0637	133	16.2	88.5	95.4	18.7	109.6	43.4	30.7	64.2
109	0722	132	11.9	94.4	49.9	12.6	101.2	41.7	20.7	75.5
110	0728	131	13.8	81.9	67.4	15.5	95.7	40.4	22.1	62.4
111	0841	130	9.3	87.2	118.0	12.4	108.3	40.7	24.6	61.0
112	0973	129	8.5	86.4	94.3	10.3	106.5	42.6	21.4	58.1
113	1076	128	8.9	83.5	87.1	12.3	104.6	41.5	21.4	64.2
114	1168	127	22.0	85.5	115.8	28.1	108.6	39.8	34.0	64.7
115	1171	126	12.5	75.7	104.2	14.7	107.5	42.9	28.7	53.9
116	1292	125	16.0	79.9	103.0	18.9	97.7	41.9	26.6	55.9
117	1300	124	16.0	78.6	87.6	20.5	99.9	40.3	27.2	58.4
118	1679	123	7.7	88.4	95.2	11.0	112.4	42.4	26.5	65.1
119	1732	122	17.3	75.7	95.5	19.6	96.2	41.9	27.4	58.8
120	1871	121	9.1	78.1	106.4	11.8	96.8	39.5	15.7	61.5
121	1879	111	24.8	83.3	96.8	29.5	99.5	38.2	31.4	61.4
122	1965	110	4.7	82.5	123.3	6.8	108.6	41.7	17.9	58.8
123	2135	109	19.4	85.0	119.7	23.6	107.4	46.3	34.5	65.6
124	2195	108	9.8	85.6	129.8	12.2	102.0	39.9	24.4	58.7
125	2357	107	22.3	88.2	85.8	26.5	107.5	46.4	34.4	61.2
126	2422	106	6.2	83.0	125.4	8.5	103.2	46.4	22.5	56.4
127	2567	119	22.7	98.9	78.1	26.6	115.7	38.2	38.0	72.8
128	2629	118	8.2	95.6	97.9	13.5	123.4	42.5	23.9	73.5
129	2725	116	14.1	85.2	118.8	18.4	114.3	43.8	32.7	59.8
130	2885	115	16.6	88.7	66.2	20.3	103.5	42.2	29.5	60.3
131	3115	114	9.5	73.8	128.3	12.1	95.7	42.5	21.4	49.8
132	3188	113	5.2	97.7	95.3	5.8	116.3	44.9	21.4	69.6
133	3966	112	11.0	81.3	81.1	13.6	97.1	40.1	19.9	63.7
134	4061	120	13.0	72.8	70.4	15.2	91.4	41.2	22.7	54.8
135	0030	164	15.0	90.1	127.9	19.6	113.2	46.6	33.5	60.1

136	0062	163	22.2	78.0	83.0	25.5	94.8	41.8	29.7	56.8
137	0094	162	21.1	92.4	69.7	23.2	103.5	45.9	30.6	67.4
138	0240	161	11.8	83.9	81.9	14.5	97.6	41.4	21.2	65.1
139	0407	168	12.2	81.6	111.9	16.2	99.8	42.1	24.5	68.3
140	0714	167	12.2	95.8	93.3	15.7	121.7	41.1	29.2	66.7
141	0842	155	15.0	86.0	86.5	18.7	105.3	42.9	24.2	70.7
142	1001	156	16.6	88.9	94.8	18.8	104.3	45.5	29.4	59.3
143	1078	142	13.2	83.6	96.2	16.7	110.9	47.9	24.2	65.7
144	1151	141	14.6	85.4	128.4	18.0	113.0	41.4	28.6	64.6
145	1204	140	16.3	81.4	141.7	20.1	104.4	42.5	26.2	63.3
146	1225	146	7.9	82.4	118.6	11.8	105.8	41.4	19.9	59.7
147	1345	145	15.2	80.4	84.1	18.0	97.2	41.2	26.7	59.7
148	1390	144	13.9	101.3	106.2	16.3	119.6	45.5	24.5	72.7
149	1465	166	21.4	80.0	131.2	25.2	95.4	43.9	31.2	59.2
150	1673	165	17.1	97.5	91.0	21.5	122.4	43.3	31.3	66.9
151	2271	139	10.8	94.8	79.9	14.5	112.8	44.2	25.4	67.7
152	2343	149	15.0	84.2	95.8	17.7	98.4	43.3	30.1	57.3
153	2360	148	16.1	83.7	93.5	19.1	99.6	46.4	23.8	66.9
154	2520	147	10.6	71.2	116.8	13.5	94.8	44.3	26.9	56.1
155	2618	152	13.2	77.6	97.9	16.4	98.5	43.4	28.2	54.4
156	2730	151	16.7	75.2	67.8	21.3	87.1	39.6	23.5	58.4
157	2866	160	13.0	80.1	90.8	14.8	94.5	42.6	23.4	62.1
158	2904	159	7.7	75.4	90.8	11.3	96.0	39.2	20.7	57.6
159	3109	158	15.3	81.3	71.6	18.5	94.7	38.5	25.5	63.3
160	3210	157	8.4	80.6	109.7	10.8	107.5	41.3	21.6	59.0
161	3408	143	11.8	82.4	121.3	13.6	105.9	43.2	20.4	62.7
162	3416	150	13.0	88.1	130.0	16.1	121.9	44.2	23.0	66.5
163	3709	154	12.9	94.4	45.0	15.9	105.4	41.7	24.0	66.5
164	3749	153	11.6	78.8	103.3	13.8	100.7	41.7	22.4	54.5

1.5 Image-Meater 4.0

NR	AM	CT	ZPF	ZPM	ML	MF	MM	VL	V4F	V4M
1	1127	7	19.5	84.1	117.9	22.6	105.1	39.5	34.1	58.1
2	1271	6	7.6	99.5	83.6	10.5	111.4	39.1	20.0	77.4
3	1381	2	12.5	82.9	121.1	14.9	109.1	44.0	26.8	64.5
4	1461	1	19.3	78.5	118.8	24.1	105.6	41.9	39.2	64.8
5	1583	3	13.9	80.2	96.2	16.2	98.0	39.7	29.1	51.0
6	1811	4	14.2	81.7	81.8	16.6	102.2	40.0	27.9	60.8
7	1959	11	14.7	93.8	92.2	18.7	111.7	43.3	34.0	62.8
8	2015	10	14.7	94.3	110.6	18.6	117.6	39.1	27.2	67.0
9	2077	9	11.4	81.6	87.5	13.3	94.9	41.8	24.1	60.3
10	2381	5	18.4	83.9	105.3	20.7	105.3	40.7	34.0	63.9
11	2504	8	11.0	80.3	123.2	13.2	101.1	44.3	26.4	56.0
12	2592	19	19.0	80.3	109.1	22.7	92.9	39.7	28.7	57.6
13	2697	18	14.2	90.6	101.7	16.7	111.2	39.6	28.2	69.6
14	2790	17	13.7	87.4	79.8	17.3	103.8	38.0	24.7	70.4
15	2955	21	11.7	76.3	98.4	14.3	97.6	42.2	26.6	52.7
16	3345	14	12.7	91.1	106.7	16.2	105.1	42.6	23.0	68.6
17	3564	13	6.6	79.7	114.4	9.4	105.3	41.4	20.7	59.1
18	3634	12	16.6	88.3	91.1	19.3	100.0	41.0	28.7	68.8
19	3917	22	24.8	76.9	103.1	29.6	104.8	42.2	38.3	50.1
20	4183	20	7.3	82.5	89.3	9.2	102.0	39.6	19.9	57.3
21	4238	16	20.4	82.7	64.3	24.2	98.5	41.8	30.7	62.6
22	4350	15	8.3	80.7	135.2	10.0	98.6	41.3	21.2	55.2
23	0496	31	18.5	79.5	100.4	20.0	95.0	44.1	29.6	57.7
24	0804	30	13.4	84.4	81.6	16.3	95.1	39.8	23.7	64.2
25	1981	28	8.7	88.3	105.8	11.9	109.0	40.8	21.7	62.5
26	2031	27	9.4	89.3	124.7	12.4	106.1	40.1	29.1	65.5
27	2196	26	10.6	75.4	91.0	12.3	95.9	44.1	23.0	52.5
28	2206	25	13.1	77.0	111.6	16.9	100.3	43.7	28.5	56.2
29	2900	23	15.1	84.4	58.6	18.2	97.1	40.7	29.3	60.8
30	2986	24	17.0	71.8	103.1	21.8	84.9	40.1	23.1	52.5
31	0028	33	6.9	84.2	101.7	9.2	107.6	42.8	18.0	60.9
32	0213	32	11.9	85.5	90.0	15.4	101.5	41.3	29.2	58.5
33	0336	43	14.7	89.4	119.9	18.2	111.5	42.0	34.0	64.6
34	0463	52	27.6	75.6	107.9	33.1	93.6	38.1	39.8	56.2
35	0607	51	16.6	79.5	50.4	17.8	87.6	38.2	21.7	60.1
36	0661	37	9.4	73.9	103.7	12.6	99.8	37.6	28.3	50.4
37	0928	36	23.1	91.0	80.5	25.6	103.7	43.0	35.2	63.2
38	0955	35	9.0	94.8	105.7	12.2	111.5	39.7	25.5	68.9
39	0999	34	15.4	80.8	97.1	19.5	99.4	39.2	27.8	58.9
40	1201	45	15.7	76.0	113.3	19.4	98.4	42.7	30.7	49.5
41	1256	44	12.0	91.2	125.5	14.4	109.8	47.7	26.8	70.3
42	1346	63	9.9	76.7	117.5	11.9	101.7	43.5	26.9	54.1
43	1483	62	19.6	74.8	95.2	21.4	92.9	40.9	27.3	60.0

44	1505	42	17.4	76.6	101.3	21.5	101.0	40.9	35.2	54.3
45	1677	61	14.0	93.4	115.7	15.0	111.7	39.0	25.5	68.5
46	1817	50	15.5	80.0	85.2	17.7	102.0	38.0	31.2	57.2
47	2038	49	6.0	84.0	95.6	11.0	105.4	39.4	24.9	55.4
48	2152	48	13.8	84.9	92.7	18.1	97.4	39.8	33.3	59.3
49	2320	47	19.8	78.9	100.2	22.4	92.1	42.6	31.4	58.8
50	2512	46	22.8	91.8	82.7	26.4	111.1	40.0	37.2	69.5
51	2576	41	13.1	102.7	96.2	15.2	117.2	43.6	29.3	69.6
52	2587	40	14.5	88.9	72.7	17.6	104.3	42.2	25.9	68.5
53	2708	39	15.0	90.0	96.9	18.7	111.3	37.7	31.8	63.6
54	2858	60	15.9	87.3	119.8	19.7	108.4	43.3	34.7	61.0
55	2912	59	13.2	90.2	108.7	16.1	108.1	40.5	24.7	60.5
56	3661	55	25.3	81.7	85.0	28.2	94.5	41.2	36.3	62.9
57	3988	69	8.9	79.4	91.8	12.2	103.0	41.7	21.7	57.8
58	4189	68	9.9	107.0	84.3	12.5	124.8	43.1	21.4	74.3
59	4390	67	11.3	83.4	115.2	13.5	105.7	45.9	29.7	56.9
60	4449	54	7.1	90.5	92.0	10.6	116.9	43.9	22.1	67.9
61	4551	53	7.5	89.9	101.9	11.4	114.4	47.0	25.0	64.6
62	4601	64	10.4	75.5	94.9	12.9	88.9	39.7	18.3	60.2
63	4911	65	30.0	74.8	96.2	35.1	91.9	43.8	41.3	51.9
64	4966	70	14.0	86.5	94.8	15.7	99.3	42.3	27.4	63.7
65	5177	66	22.7	83.3	96.3	28.0	96.3	38.1	33.7	62.2
66	5310	57	5.7	79.1	115.2	8.1	106.5	40.4	19.6	56.5
67	5393	56	11.8	58.5	107.3	14.7	86.1	42.2	20.7	42.8
68	0030	73	15.5	95.7	64.4	18.5	110.5	42.9	25.0	67.3
69	0259	72	22.4	93.4	92.9	25.3	114.1	43.2	32.6	70.2
70	0287	71	25.4	90.3	78.0	29.2	101.9	39.8	40.6	62.5
71	0411	84	18.1	90.2	101.1	22.1	109.0	42.2	31.8	58.5
72	0494	83	7.2	82.0	89.8	9.8	108.7	40.7	21.4	60.2
73	0562	96	12.3	76.5	95.8	17.1	99.3	41.7	22.2	66.1
74	0997	98	11.6	91.2	85.8	14.4	108.2	41.9	24.5	69.3
75	1073	99	18.7	79.5	117.5	22.8	97.4	38.6	36.5	59.9
76	1128	97	21.8	87.5	90.4	28.9	98.7	39.7	38.8	60.8
77	1374	105	16.4	82.6	80.5	20.7	97.3	41.9	27.7	61.3
78	1417	104	15.7	94.0	94.3	18.5	116.6	40.3	31.6	68.4
79	1590	103	12.7	90.8	96.8	16.1	108.5	42.8	31.0	61.9
80	1632	102	12.7	94.2	72.0	16.1	110.2	43.0	26.3	70.4
81	1736	101	16.6	91.5	105.1	19.6	106.9	43.3	29.8	63.2
82	1842	100	11.7	91.4	94.9	16.8	115.3	43.3	30.1	63.2
83	2184	78	11.4	66.6	97.3	13.2	87.4	39.7	18.8	47.4
84	2192	77	11.8	101.6	88.8	14.3	121.7	42.8	28.6	72.2
85	2402	76	8.2	82.6	123.8	9.5	95.9	41.5	20.2	61.4
86	2748	75	8.8	80.1	121.6	11.6	101.4	39.5	27.7	58.7
87	2894	74	13.8	78.9	119.9	16.2	109.2	41.7	27.6	55.0
88	2942	95	9.6	95.6	103.9	11.9	115.8	40.4	16.3	75.6
89	2953	89	12.2	84.4	103.7	15.0	104.3	40.3	25.6	55.7

90	3190	88	8.5	81.8	79.5	12.4	101.0	43.2	21.4	59.5
91	3334	82	6.9	88.4	92.0	8.8	104.6	42.3	21.4	61.9
92	3370	81	19.2	79.0	82.9	22.1	92.0	44.1	32.5	58.3
93	3502	80	9.9	57.2	103.0	11.8	81.2	39.4	24.5	45.5
94	3543	94	10.3	84.8	99.1	11.9	102.7	41.8	23.1	59.9
95	3640	93	11.2	85.3	98.8	13.3	103.3	37.2	22.4	64.2
96	3764	92	15.5	83.8	121.4	19.2	105.3	46.0	31.0	55.1
97	3879	91	27.6	81.9	78.0	30.2	92.6	40.8	32.1	65.7
98	3947	87	25.2	67.5	101.2	28.2	84.1	42.0	33.7	51.7
99	4052	86	18.0	96.0	114.1	21.3	117.2	42.8	31.8	70.4
100	4153	85	13.4	80.9	96.4	16.3	100.5	39.8	30.5	59.7
101	4267	79	9.6	81.3	87.7	11.1	96.7	43.1	25.0	56.8
102	4337	90	7.9	81.9	105.7	12.0	106.9	40.3	27.4	57.9
103	0018	138	19.8	80.5	93.2	21.7	90.0	39.2	28.3	62.7
104	0164	137	12.6	74.1	111.3	14.7	92.5	43.8	23.4	55.8
105	0278	136	8.7	81.1	106.1	10.7	96.8	39.4	21.1	61.7
106	0391	135	10.7	92.5	110.7	14.6	115.8	40.2	28.5	63.6
107	0424	134	15.4	101.5	106.4	19.1	122.7	41.3	29.6	80.9
108	0637	133	15.8	88.8	98.5	18.3	108.1	43.1	30.9	63.7
109	0722	132	11.7	95.4	48.4	12.0	102.4	41.3	22.3	71.4
110	0728	131	13.4	84.0	65.8	15.2	98.6	38.9	25.4	61.2
111	0841	130	8.8	86.3	119.8	12.0	107.8	40.2	24.9	58.4
112	0973	129	8.3	82.1	95.7	10.7	108.7	41.9	22.2	57.6
113	1076	128	9.2	81.8	88.7	12.7	102.3	40.8	23.5	63.1
114	1168	127	22.6	82.6	124.3	29.1	107.6	38.8	37.6	60.7
115	1171	126	11.8	75.5	125.6	15.2	107.2	41.0	29.6	53.8
116	1292	125	17.3	76.7	111.3	20.1	93.3	38.5	28.5	54.0
117	1300	124	16.1	78.2	88.4	20.4	98.5	40.8	28.7	55.5
118	1679	123	6.6	85.3	90.3	8.6	106.9	42.9	22.6	62.0
119	1732	122	15.4	72.5	96.0	19.3	91.9	41.5	30.9	54.0
120	1871	121	9.6	77.0	109.7	11.7	94.2	37.5	17.9	59.8
121	1879	111	24.6	84.0	99.3	29.3	101.2	38.2	34.2	59.0
122	1965	110	5.2	79.1	123.5	7.1	101.0	42.8	19.1	56.0
123	2135	109	18.4	86.6	112.3	22.0	108.1	44.9	34.4	65.8
124	2195	108	9.0	80.0	125.2	12.0	100.1	37.4	25.1	57.4
125	2357	107	21.6	77.2	95.3	25.6	101.9	47.2	35.5	60.3
126	2422	106	8.9	80.9	131.1	10.6	99.8	44.4	23.4	57.3
127	2567	119	23.1	99.4	80.0	26.9	115.1	38.8	40.1	70.9
128	2629	118	8.8	96.5	101.5	14.1	124.7	42.3	24.5	74.8
129	2725	116	14.0	81.0	116.6	18.1	108.7	44.9	34.8	55.9
130	2885	115	16.7	87.5	66.4	19.9	105.3	41.7	30.5	61.3
131	3115	114	10.3	74.7	140.1	12.6	95.8	41.7	22.1	49.6
132	3188	113	5.0	98.4	96.0	5.8	114.5	45.5	22.9	68.9
133	3966	112	10.7	80.8	81.3	14.4	96.1	41.0	21.5	63.7
134	4061	120	12.7	72.6	75.1	15.1	93.6	38.6	23.1	54.4
135	0030	164	15.6	87.9	105.8	18.7	109.9	44.1	35.4	58.4

136	0062	163	22.7	75.3	86.7	26.1	92.1	40.9	30.3	57.3
137	0094	162	21.7	93.6	77.9	24.8	103.6	44.9	35.9	65.0
138	0240	161	12.5	86.1	78.3	15.8	101.2	42.1	22.0	65.5
139	0407	168	13.1	82.9	111.3	16.6	100.7	41.2	26.5	68.2
140	0714	167	11.2	87.0	94.7	14.9	109.9	44.9	31.3	56.8
141	0842	155	14.5	82.7	89.3	18.6	101.4	41.2	26.7	68.5
142	1001	156	17.1	92.4	92.7	18.6	106.3	46.0	31.5	54.0
143	1078	142	14.5	81.0	96.0	18.2	109.1	47.4	27.2	61.8
144	1151	141	13.3	86.2	127.0	17.1	113.1	42.0	31.1	60.8
145	1204	140	16.9	81.8	117.5	19.8	103.8	41.6	29.6	62.6
146	1225	146	9.6	82.3	118.0	13.0	103.3	40.6	21.7	59.1
147	1345	145	15.6	81.4	84.9	17.9	96.4	40.2	27.2	59.0
148	1390	144	13.5	89.3	116.4	16.8	118.7	44.9	29.7	63.0
149	1465	166	21.9	76.8	133.9	25.0	93.4	44.9	32.2	53.4
150	1673	165	16.1	100.1	91.6	21.6	124.8	44.8	33.0	64.8
151	2271	139	12.1	93.7	73.9	15.2	108.9	45.8	28.1	66.8
152	2343	149	15.0	82.9	96.5	17.3	97.0	44.0	31.1	55.5
153	2360	148	16.5	83.0	89.9	19.5	97.6	47.6	26.8	64.9
154	2520	147	11.5	73.7	113.2	13.8	96.7	43.3	29.2	54.4
155	2618	152	15.2	83.5	91.7	17.8	103.9	41.7	31.7	53.6
156	2730	151	15.6	75.5	75.3	17.4	87.9	39.7	23.8	56.1
157	2866	160	13.6	86.4	95.7	16.2	103.6	44.4	27.0	59.9
158	2904	159	9.0	75.4	90.7	11.6	95.0	38.4	22.4	56.5
159	3109	158	16.4	79.3	82.3	18.8	93.8	37.9	27.9	60.1
160	3210	157	8.1	74.8	110.7	10.5	100.0	40.4	22.9	54.4
161	3408	143	9.4	87.6	135.7	11.3	106.0	42.2	21.6	61.2
162	3416	150	12.5	91.0	128.7	16.6	128.7	47.3	26.3	62.9
163	3709	154	12.8	94.8	46.3	15.8	106.1	42.3	24.8	65.1
164	3749	153	12.6	76.6	104.9	14.3	96.1	41.7	24.4	53.9