

## Ausführliche Pipeline zur Prozessierung der Rohdaten

### 1. Festlegen des Arbeitsverzeichnisses

```
> cd /home/kj/Schreibtisch/Pipeline/
```

### 2. Import der Daten

```
> qiime tools import \  
  --type 'SampleData[PairedEndSequencesWithQuality]' \  
  --input-path ./Rohdaten/demux \ #gesamter Ordner mit allen Reads  
  --output-path ./Sequenzierung1/demultiplexed-paired-end.qza  
  --input-format CasavaOneEightSingleLanePerSampleDirFmt
```

### 3. Denoising mit dem Plugin Dada2

```
> qiime dada2 denoise-paired \  
  --i-demultiplexed-seqs ./Sequenzierung1/demultiplexed-paired-end.qza \  
  --p-trim-left-f 0 \ # Position, an der die Sequenz aufgrund schlechter Qualität abgeschnitten werden soll.  
  --p-trim-left-r 0 \  
  --p-trunc-len-f 180 \ # gesamte Länge der Sequenz (nach 180 Basen nimmt die Qualität ab)  
  --p-trunc-len-r 180  
  --p-n-threads 4 # Anzahl der genutzten Threads (wichtig für Datenintensive Prozesse), spezifiziert man die  
  Angabe nicht, wird automatisch 1 Thread genutzt  
  --o-representative-sequences ./Sequenzierung1/rep-seqs-dada2.qza \  
  --o-table ./Sequenzierung1/table-dada2.qza \  
  --o-denoising-stats ./Sequenzierung1/stats-dada2.qza \  
  --verbose
```

### Optionale Parameter: Sollten viele Chimeren vorliegen

```
> --p-chimera-method ,consensus\  
  --p-min-fold-parent-over-abundance 8
```

### 4. Erstellung einer Tabelle zur Visualisierung der Ergebnisse + Visualisierung

```
> qiime metadata tabulate \  
  --m-input-file ./Sequenzierung1/stats-dada2.qza \  
  --o-visualization ./Sequenzierung1/stats-dada2.qzv  
  
> qiime tools view ./Sequenzierung1/stats-dada2.qzv
```

### 5. Darstellung der Anzahl an Sequenzen, die zu den einzelnen ASVs zugeordnet wurden

```
> qiime feature-table summarize \  
  --i-table ./Sequenzierung1/table-dada2.qza \  
  --o-visualization ./Sequenzierung1/table-dada2.qzv \  
  --m-sample-metadata-file ./Rohdaten/mapping-file.tsv'  
  
> qiime tools view ./Sequenzierung1/table-dada2.qzv
```

### 6. Darstellung der Sequenzen, die den ASVs zugeordnet wurden

```
> qiime feature-table tabulate-seqs \  
  --i-data ./Sequenzierung1/rep-seqs-dada2.qza \  
  --o-visualization ./Sequenzierung1/rep-seqs-dada2.qzv  
  
> qiime tools view ./Sequenzierung1/rep-seqs-dada2.qzv
```

### 7. Zusammenfügen verschiedener Läufe

## 7.1 Zusammenfügen der ASV-Verteilungen

```
> qiime feature-table merge \  
  --i-tables ./Sequenzierung1/table-dada2.qza \  
  --i-tables ./Sequenzierung2/table-dada2.qza \  
  --p-overlap-method sum \  
  --o-merged-table ./Merged/merged-table.qza
```

## 7.2 Zusammenfügen der verschiedenen ASVs

```
> qiime feature-table merge-seqs \  
  --i-data ./Sequenzierung1/rep-seqs-dada2.qza \  
  --i-data ./Sequenzierung2/rep-seqs-dada2.qza \  
  --o-merged-data ./Merged/rep-seqs.qza
```

## 8. Filtern

### 8.1 ASVs, die seltener als 20 mal in einer Probe vorkommen und in weniger als 5 Proben werden herausgefiltert

```
> qiime feature-table filter-features \  
  --i-table ./Merged/merged-table.qza \  
  --p-min-frequency 20 \  
  --p-min-samples 5 \  
  --o-filtered-table ./Merged/temp1.qza
```

### 8.2 ASVs, die weniger als 10.000 Reads zeigen, werden herausgefiltert (Schwellenwert muss vorher festgelegt und dann beibehalten werden)

```
> qiime feature-table filter-samples \  
  --i-table ./Merged/temp1.qz \  
  --p-min-frequency 10000 \  
  --o-filtered-table ./Merged/temp2.qza'
```

## 9. Taxonomische Zuordnung der ASVs mit einer zuvor festgelegten Datenbank

```
> qiime feature-classifier classify-sklearn \  
  --i-classifier ./Rohdaten/silva-132-99-515-806-n-classifier.qza \  
  --i-reads ./Merged/rep-seqs.qza \  
  --p-reads-per-batch # eine niedrige Zahl (z.B. 1000) ermöglicht eine Benutzung bei einer geringen  
  Anzahl an GB  
  --p-n-jobs # am Besten auf 1 stellen  
  --o-classification ./Merged/taxonomy.qza  
  --verbose  
  
> Visuelle Darstellung als Tabelle  
  qiime metadata tabulate \  
  --m-input-file ./Merged/taxonomy.qza \  
  --o-visualization ./Merged/taxonomy.qzv  
  --verbose
```

## 10. Darstellung der Ergebnisse als interaktives Säulendiagramm

```
> qiime taxa barplot \  
  --i-table ./Merged/table-dada.qza \  
  --i-taxonomy ./Merged/taxonomy.qza \  
  --m-metadata-file ./Rohdaten/mapping-file.tsv  
  --o-visualization ./Merged/taxa-bar-plots.qzv  
  
> qiime tools view ./Merged/taxa-bar-plots.qzv
```

## 11. Exportieren der Daten (Taxonomie und ASV-Verteilung wurden separat exportiert)

### 11.1 Ordner für die Exporte erstellen

```
> mkdir ./Merged/exports
```

## 11.2 ASV-Verteilung als biom-File exportieren

```
> qiime tools export \  
  --input-path ./Merged/table-dada.qza \  
  --output-path ./Merged/exports/feature-table
```

## 11.3 Umwandeln des biom-Files in ein tsv-File

```
> biom convert \  
  -i ./Merged/exports/feature-table/feature-table.biom \  
  -o ./Merged/exports/feature_table/feature-table.tsv \  
  --to-tsv
```

## 11.4 Export der Taxonomie

```
> qiime tools export \  
  --input-path ./Merged/taxonomy.qza \  
  --output-path ./Merged/exports
```

## 12. Erstellung eines phylogenetischen Baums (wichtig für phylogenetische Diversitätsanalysen)

```
> qiime phylogeny align-to-tree-mafft-fasttree \  
  --i-sequences ./Merged/rep-seqs.qza \  
  --o-alignment ./Merged/aligned-rep-seqs.qza \  
  --o-masked-alignment ./Merged/masked-aligned-rep-seqs.qza \  
  --o-tree ./Merged/unrooted-tree-dada2.qza \  
  --o-rooted-tree ./Merged/rooted-tree-dada2.qza \  
  --verbose
```

## 13. Export des phylogenetischen Baums

```
qiime tools export \  
  --input-path ./Merged/unrooted-tree.qza \  
  --output-path ./Merged/exported-tree
```

## 14. Darstellung der Rarefaction

```
> qiime diversity alpha-rarefaction \  
  --i-table ./Merged/table-dada.qza \  
  --i-phylogeny ./Merged/rooted-tree-dada2.qza \  
  --p-max-depth 4000 \  
  --m-metadata-file ./Rohdaten/mapping-file.tsv \  
  --o-visualization ./Merged/alpha-rarefaction.qzv
```

## 15. Beta-Diversitäts-Analysen

```
> qiime diversity core-metrics-phylogenetic \  
  --i-phylogeny ./Merged/rooted-tree-dada2.qza \  
  --i-table ./Merged/table-dada.qza \  
  --p-sampling-depth 350 \  
  --m-metadata-file ./Rohdaten/mapping-file.tsv \  
  --output-dir ./Merged/core-metrics-results
```

## Konzentrationen der extrahierten DNA

### 1. Vorversuche

V	Name	Beschreibung	Konzentration	260/280	260/230
VV	VV-SF-N.1	gefiltertes Seewasser, Nullprobe, Tag 1	3,8 ng/µl	2,25	0,21
VV	VV-SF-N.14	gefiltertes Seewasser, Nullprobe, Tag 14	1,8 ng/µl	3,04	0,25
VV	VV-SF-K.7	gefiltertes Seewasser, Gewebeprobe, Tag 7	24,2 ng/µl	2,0	1,4
VV	VV-SF-K.14	gefiltertes Seewasser, Gewebeprobe, Tag 14	22,2 ng/µl	2,12	1,1
VV	VV-S-N.1	ungefiltertes Seewasser, Nullprobe, Tag 1	4,0 ng/µl	2,0	0,36
VV	VV-S-N.14	ungefiltertes Seewasser, Nullprobe, Tag 14	1,5 ng/µl	12,32	0,14
VV	VV-S-K.7	ungefiltertes Seewasser, Gewebeprobe, Tag 7	21,5 ng/µl	1,93	1,27
VV	VV-S-K.14	ungefiltertes Seewasser, Gewebeprobe, Tag 14	36,6 ng/µl	1,78	1,75
VV	VV-LF-N.1	gefiltertes Leitungswasser, Nullprobe, Tag 1	2,5 ng/µl	-1,7	0,17
VV	VV-LF-N.14	gefiltertes Leitungswasser, Nullprobe, Tag 14	2,0 ng/µl	1,7	0,24
VV	VV-LF-K.7	gefiltertes Leitungswasser, Gewebeprobe, Tag 7	8,4 ng/µl	2,34	0,76
VV	VV-LF-K.14	gefiltertes Leitungswasser, Gewebeprobe, Tag 14	24,8 ng/µl	2,18	0,86
VV	VV-L-N.1	ungefiltertes Leitungswasser, Nullprobe, Tag 1	1,4 ng/µl	4,19	0,15
VV	VV-L-N.14	ungefiltertes Leitungswasser, Nullprobe, Tag 14	1,5 ng/µl	32,61	0,13
VV	VV-L-K.7	ungefiltertes Leitungswasser, Gewebeprobe, Tag 7	18,6 ng/µl	1,82	0,9
VV	VV-L-K.14	ungefiltertes Leitungswasser, Gewebeprobe, Tag 14	21,7 ng/µl	1,81	1,36

### 2. Kontrollen

V	Name	Beschreibung	Konzentration	260/280	260/230
Kontrolle	FS1	Sediment, Frühling	103.93 ng/µl	1.928	1.463
Kontrolle	FS2	Sediment, Frühling	72.14 ng/µl	1.969	1.583
Kontrolle	FS3	Sediment, Frühling	53.268 ng/µl	1.97	1.205
Kontrolle	SS1	Sediment, Sommer	58.267 ng/µl	1.965	1.469
Kontrolle	SS2	Sediment, Sommer	79.105 ng/µl	1.958	1.748
Kontrolle	SS3	Sediment, Sommer	69.406 ng/µl	1.977	1.652
Kontrolle	HS1	Sediment, Herbst	75.222 ng/µl	1.852	1.093
Kontrolle	HS2	Sediment, Herbst	72.936 ng/µl	1.925	1.653
Kontrolle	HS3	Sediment, Herbst	64.092 ng/µl	1.938	1.659
Kontrolle	WS1	Sediment, Winter	6.04 ng/µl	2.314	0.218
Kontrolle	WS2	Sediment, Winter	8.433 ng/µl	2.038	0.329
Kontrolle	WS3	Sediment, Winter	13.174 ng/µl	1.949	0.521
Kontrolle	L1	Leerprobe	5.241 ng/µl	2.794	0.157
Kontrolle	L2	Leerprobe	3.237 ng/µl	12.745	0.131
Kontrolle	L3	Leerprobe	1.176 ng/µl	3.994	0.128
Kontrolle	MMC1	Mock Community	2.97 ng/µl	1.91	0.193
Kontrolle	MMC2	Mock Community	6.429 ng/µl	2.01	0.306
Kontrolle	MMC3	Mock Community	9.638 ng/µl	2.016	0.413

### 3. Versuchsreihen V1 - V8

	Name	Konzentration	260/280	260/230	V	Name	Konzentration	260/280	260/230
1	V1-1.N1	15,2 ng/µl	2,3	0,46	2	V2-1.N1.1	3,63 ng/µl	2,68	0,25
1	V1-1.N2	52,4 ng/µl	1,84	0,52	2	V2-1.N1.2	2,68 ng/µl	5,42	0,25
1	V1-1.N3	4,5 ng/µl	2,53	0,54	2	V2-1.K1	231,8 ng/µl	1,88	2,22
1	V1-1.K1	172,8 ng/µl	1,79	2,05	2	V2-1.K2	196,39 ng/µl	1,88	2,22
1	V1-1.K2	125,8 ng/µl	1,91	1,86	2	V2-1.K3	256 ng/µl	1,88	2,13
1	V1-1.K3	178,1 ng/µl	1,86	1,25	2	V2-2.W4	7,03 ng/µl	2,23	0,4
1	V1-2.W4	13,0 ng/µl	1,61	1,12	2	V2-2.W5	32,37 ng/µl	1,93	1,08
1	V1-2.W5	18,1 ng/µl	1,76	0,87	2	V2-2.W6	36,43 ng/µl	1,64	1,06
1	V1-2.W6	10,4 ng/µl	1,68	0,82	2	V2-2.K4	84,0 ng/µl	1,9	1,89
1	V1-2.K4	128,1 ng/µl	1,82	1,65	2	V2-2.K5	210,12 ng/µl	1,87	2,09
1	V1-2.K5	126,2 ng/µl	1,85	2,07	2	V2-2.K6	67,67 ng/µl	1,88	1,71
1	V1-2.K6	81,4 ng/µl	1,85	1,9	2	V2-3.W7	28,12 ng/µl	1,9	1,067
1	V1-3.W7	4,5 ng/µl	3,05	0,37	2	V2-3.W8	8,14 ng/µl	1,97	0,747
1	V1-3.W8	13,4 ng/µl	1,79	0,63	2	V2-3.W9	20,93 ng/µl	2	1,12
1	V1-3.W9	3,8 ng/µl	1,73	0,31	2	V2-3.K7	44,81 ng/µl	1,924	1,59
1	V1-3.K7	45,7 ng/µl	1,84	1,37	2	V2-3.K8	50,7 ng/µl	1,916	1,28
1	V1-3.K8	50,9 ng/µl	1,92	1,44	2	V2-3.K9	50,63 ng/µl	1,903	1,64
1	V1-3.K9	44,5 ng/µl	1,92	1,32	2	V2-4.W10	26,54 ng/µl	1,9	1,34
1	V1-4.W10	2,8 ng/µl	3,18	0,27	2	V2-4.W11	22,21 ng/µl	1,9	0,88
1	V1-4.W11	23,9 ng/µl	1,95	1,27	2	V2-4.W12	19,59 ng/µl	1,9	0,95
1	V1-4.W12	12,8 ng/µl	1,92	0,48	2	V2-4.K10	42,89 ng/µl	1,9	1,56
1	V1-4.K10	54,3 ng/µl	1,79	0,63	2	V2-4.K11	42,15 ng/µl	1,9	1,48
1	V1-4.K11	40,9 ng/µl	1,87	1,21	2	V2-4.K12	21,71 ng/µl	1,9	1,22
1	V1-4.K12	33,2 ng/µl	1,8	1,31	2	V2-7.W13	19,16 ng/µl	1,95	1,05
1	V1-7.W13	2,8 ng/µl	3,49	0,2	2	V2-7.W14	10,37 ng/µl	1,9	0,56
1	V1-7.W14	21,28 ng/µl	1,95	0,84	2	V2-7.W15	13,84 ng/µl	1,9	0,84
1	V1-7.W15	2,9 ng/µl	2,93	0,22	2	V2-7.N7.1	34,1 ng/µl	2	1,1
1	V1-7.K13	26,82 ng/µl	1,91	1,32	2	V2-7.K13	21,63 ng/µl	1,88	0,88
1	V1-7.K14	36,41 ng/µl	1,94	1,41	2	V2-7.K14	22,68 ng/µl	1,9	1,27
1	V1-7.K15	20,05 ng/µl	2,05	1,24	2	V2-7.K15	19,65 ng/µl	1,9	1,07
1	V1-7.N0	4,3 ng/µl	2,32	0,36	2	V2-14.W16	31,33 ng/µl	1,97	1,26
1	V1-14.W16	23,62 ng/µl	1,873	0,911	2	V2-14.W17	35,77 ng/µl	1,98	1,14
1	V1-14.W17	28,93 ng/µl	1,907	1,209	2	V2-14.W18	52,69 ng/µl	1,95	1,2
1	V1-14.W18	24,01 ng/µl	1,824	1,338	2	V2-14.K16	39,85 ng/µl	1,92	1,16
1	V1-14.K16	26,89 ng/µl	1,822	0,231	2	V2-14.K17	24,64 ng/µl	1,9	1,13
1	V1-14.K17	36,13 ng/µl	1,825	0,957	2	V2-14.K18	40,51 ng/µl	1,92	1,49
1	V1-14.K18	44,12 ng/µl	1,873	1,349	2	V2-14.N14.1	85,34 ng/µl	1,9	1,46
1	V1-14.N0	3,35 ng/µl	1,835	1,527	2	V2-21.W19	71,67 ng/µl	1,91	1,44
1	V1-21.W19	21,06 ng/µl	1,94	1,08	2	V2-21.W20	38,59 ng/µl	1,95	1,04
1	V1-21.W20	7,55 ng/µl	2,12	0,66	2	V2-21.W21	70,34 ng/µl	1,9	1,34
1	V1-21.W21	47,77 ng/µl	1,93	1,36	2	V2-21.K19	29,34 ng/µl	1,9	1,15
1	V1-21.N0	2,3 ng/µl	3,71	0,2	2	V2-21.K20	43,61 ng/µl	1,93	0,9

1	V1-21.K19	60,19 ng/µl	1,9	1,4	2	V2-21.K21	20,9 ng/µl	1,97	0,67
1	V1-21.K20	82,61 ng/µl	1,9	2,1	2	V2-21.N21.1	46,4 ng/µl	1,9	1,22
1	V1-21.K21	97,3 ng/µl	1,9	1,9	2	V2-1.N1.1	3,63 ng/µl	2,68	0,25
V	Name	Konzentration	260/280	260/230	V	Name	Konzentration	260/280	260/230
3	V3-1.K1	146,98 ng/µl	1,87	2,94	4	V4-1.K1	173,05 ng/µl	1,9	1,85
3	V3-1.K2	201,86 ng/µl	1,88	4,04	4	V4-1.K2	200,74 ng/µl	1,87	2,14
3	V3-1.K3	195,38 ng/µl	1,88	3,91	4	V4-1.K3	199,11 ng/µl	1,89	1,95
3	V3-2.K4	130,88 ng/µl	1,88	1,89	4	V4-2.K4	115,61 ng/µl	1,89	2,07
3	V3-2.K5	97,36 ng/µl	1,89	1,68	4	V4-2.K5	119,14 ng/µl	1,88	2,4
3	V3-2.K6	108,25 ng/µl	1,89	1,45	4	V4-2.K6	129,54 ng/µl	1,88	1,87
3	V3-3.K7	54,31 ng/µl	1,93	1,42	4	V4-3.K7	94,47 ng/µl	1,88	1,98
3	V3-3.K8	29,76 ng/µl	1,95	0,9	4	V4-3.K8	85 ng/µl	1,88	1,92
3	V3-3.K9	53,88 ng/µl	1,89	1,35	4	V4-3.K9	94,13 ng/µl	1,53	0,45
3	V3-4.K10	32,3 ng/µl	1,92	0,79	4	V4-4.K10	84,17 ng/µl	1,83	1,85
3	V3-4.K11	30,21 ng/µl	1,96	0,92	4	V4-4.K11	93,52 ng/µl	1,86	1,76
3	V3-4.K12	20,76 ng/µl	1,99	0,78	4	V4-4.K12	80,42 ng/µl	1,88	1,75
3	V3-7.K13	35,9 ng/µl	1,85	1,14	4	V4-7.K13	16,11 ng/µl	1,86	0,83
3	V3-7.K14	50,93 ng/µl	1,84	1,35	4	V4-7.K14	10,66 ng/µl	1,87	0,74
3	V3-7.K15	18,12 ng/µl	1,82	0,87	4	V4-7.K15	12,2 ng/µl	1,99	0,7
3	V3-14.K16	49,75 ng/µl	1,85	1,3	4	V4-14.K16	16,57 ng/µl	2,07	1,07
3	V3-14.K17	24,39 ng/µl	1,84	1,27	4	V4-14.K17	19,44 ng/µl	2,05	0,71
3	V3-14.K18	25,8 ng/µl	1,82	1,68	4	V4-14.K18	13,33 ng/µl	2,18	0,7
3	V3-21.K19	33,2 ng/µl	1,85	1,53	4	V4-21.K19	15,42 ng/µl	2,11	0,78
3	V3-21.K20	47,48 ng/µl	1,89	1,46	4	V4-21.K20	30,72 ng/µl	1,94	0,52
3	V3-21.K21	36,2 ng/µl	1,9	1,41	4	V4-21.K21	15,99 ng/µl	2,04	0,81
3	V3-1.N1.1	6,71 ng/µl	2,13	0,13	4	V4-1.N1.1	2,21 ng/µl	2,69	0,21
3	V3-1.N1.2	11,01 ng/µl	2,14	0,22	4	V4-1.N1.2	5,28 ng/µl	2,68	0,17
3	V3-7.N7.1	5,64 ng/µl	2,13	0,22	4	V4-7.N7.1	3,77 ng/µl	2,26	0,23
3	V3-7.N7.2	4,34 ng/µl	1,78	0,21	4	V4-7.N7.2	28,47 ng/µl	1,94	1,18
3	V3-14.N14.1	3,3 ng/µl	1,71	0,24	4	V4-14.N14.1	8,87 ng/µl	2,28	0,17
3	V3-14.N14.2	4,62 ng/µl	2,01	0,21	4	V4-14.N14.2	3,52 ng/µl	8,13	0,11
3	V3-21.N21.1	4,38 ng/µl	1,8	0,22	4	V4-21.N21.1	7,7 ng/µl	2,28	0,47
3	V3-21.N21.2	3,52 ng/µl	2,41	0,28	4	V4-21.N21.2	8,28 ng/µl	2,35	0,41

V	Name	Konzentration	260/280	260/230	V	Name	Konzentration	260/280	260/230
5	V5-1.K1	168,58 ng/µl	1,88	2,01	6	V6-1.K1	156,729	1,91	1,81
5	V5-1.K2	138,67 ng/µl	1,87	2,15	6	V6-1.K2	170,554	1,899	1,9
5	V5-1.K3	187,88 ng/µl	1,86	1,99	6	V6-1.K3	190,822	1,887	1,93
5	V5-2.K4	69,94 ng/µl	1,89	1,94	6	V6-2.K4	131,222	1,894	1,807
5	V5-2.K5	114,47 ng/µl	1,87	2,09	6	V6-2.K5	44,1	1,953	0,684
5	V5-2.K6	42,36 ng/µl	1,86	1,68	6	V6-2.K6	99,311	1,907	1,743
5	V5-3.K7	27,91 ng/µl	1,89	1,31	6	V6-3.K7	29,959	1,913	0,758
5	V5-3.K8	41,25 ng/µl	1,91	0,88	6	V6-3.K8	102,407	1,903	1,782
5	V5-3.K9	42,79 ng/µl	1,92	1,45	6	V6-3.K9	119,427	1,908	1,546

5	V5-4.K10	27,91 ng/µl	1,89	1,31	6	V6-4.K10	32.389	2.02	0.997
5	V5-4.K11	41,25 ng/µl	1,91	0,88	6	V6-4.K11	52.202	1.92	1.545
5	V5-4.K12	42,79 ng/µl	1,92	1,45	6	V6-4.K12	24.326	2.101	0.667
5	V5-7.K13	52,11 ng/µl	1,9	1,62	6	V6-7.K13	16.255	1.942	0.395
5	V5-7.K14	44,7 ng/µl	1,94	1,69	6	V6-7.K14	24.596	1.87	0.251
5	V5-7.K15	36,79 ng/µl	1,88	1,37	6	V6-7.K15	32.33	1.968	0.982
5	V5-14.K16	51,71 ng/µl	1,89	1,71	6	V6-14.K16	23.952	1.966	0.748
5	V5-14.K17	83,67 ng/µl	1,89	1,69	6	V6-14.K17	38.512	1.922	0.932
5	V5-14.K18	39,08 ng/µl	1,91	1,64	6	V6-14.K18	15.726	2.034	0.674
5	V5-21.K19	106,79 ng/µl	1,87	1,56	6	V6-21.K19	14.582	2.095	0.907
5	V5-21.K20	42,48 ng/µl	1,88	0,82	6	V6-21.K20	9.423	2.268	0.425
5	V5-21.K21	53,77 ng/µl	1,88	1,81	6	V6-21.K21	14.865	2.161	1.143
5	V5-21.K22	30,48 ng/µl	1,86	0,98	6	V6-1.N1.1	2.773	2.54	0.182
5	V5-21.K23	28,5 ng/µl	1,83	1,0	6	V6-1.N1.2	3.309	2.952	0.174
5	V5-1.N1.1	9,32 ng/µl	1,97	0,45	6	V6-7.N7.1	4.385	1.697	0.1
5	V5-1.N1.2	7,86 ng/µl	2,18	0,14	6	V6-7.N7.2	2.261	4.14	0.186
5	V5-7.N7.1	8,14 ng/µl	2,13	0,32	6	V6-14.N14.1	2.088	2.389	0.148
5	V5-7.N7.2	9,67 ng/µl	1,93	0,53	6	V6-14.N14.2	1.527	5.725	0.109
5	V5-14.N14.1	13,85 ng/µl	1,87	0,67	6	V6-21.N21.1	1.506	5.745	0.142
5	V5-14.N14.2	5,82 ng/µl	1,46	0,29	6	V6-21.N21.2	2.869	2.427	0.156
5	V5-21.N21.1	7,7 ng/µl	2,28	0,47	6				
5	V5-21.N21.2	8,28 ng/µl	2,35	0,41	6				

V	Name	Konzentration	260/280	260/230	V	Name	Konzentration	260/280	260/230
7	V7-2.K4	153.14	1.896	1.889	8	V8-1.K1	161.5	1.884	2.11
7	V7-2.K5	101.837	1.901	1.607	8	V8-1.K2	111.962	1.886	1.898
7	V7-2.K6	113.989	1.906	1.818	8	V8-1.K3	116.127	1.883	1.9
7	V7-3.K7	116.661	1.896	1.938	8	V8-2.K4	89.229	1.874	1.572
7	V7-3.K8	85.914	1.902	1.707	8	V8-2.K5	121.71	1.885	1.912
7	V7-3.K9	84.003	1.874	1.835	8	V8-2.K6	108.497	1.885	1.81
7	V7-4.K10	71.487	1.898	1.708	8	V8-3.K7	73.324	1.964	1.374
7	V7-4.K11	15.116	2.05	0.829	8	V8-3.K8	89.949	1.909	1.693
7	V7-4.K12	40.426	1.893	0.892	8	V8-3.K9	79.62	1.903	1.943
7	V7-7.K13	63.699	1.948	1.36	8	V8-4.K10	119.193	1.845	0.565
7	V7-7.K14	39.827	1.978	0.961	8	V8-4.K11	77.719	1.882	1.796
7	V7-7.K15	26.117	2.041	0.981	8	V8-4.K12	118.546	1.869	1.814
7	V7-14.K16	29.996	2.034	1.218	8	V8-7.K13	18.807	2.006	0.574
7	V7-14.K17	18.208	2.126	0.754	8	V8-7.K14	17.912	2.112	0.083
7	V7-14.K18	33.792	1.992	1.325	8	V8-7.K15	26.57	1.971	0.842
7	V7-21.K19	43.319	1.989	1.022	8	V8-14.K16	14.542	1.963	0.546
7	V7-21.K20	46.212	1.998	1.542	8	V8-14.K17	12.832	2.039	0.513
7	V7-21.K21	43.239	2.005	1.111	8	V8-14.K18	22.834	2.013	0.569
7	V7-1.N1.2	8.752	2.669	0.288	8	V8-21.K19	5.347	2.18	0.411

7	V7-1.N1.3	6.571	2.772	0.407	8	V8-21.K20	5.663	2.256	0.295
7	V7-7.N7.1	3.23	16.811	0.119	8	V8-21.K21	10.218	2.055	0.397
7	V7-7.N7.2	2.894	28.819	0.118	8	V8-1.N1.1	3.475	3.576	0.183
7	V7-14.N14.1	2.199	-21.546	0.141	8	V8-1.N1.3	3.457	3.042	0.15
7	V7-14.N14.2	4.15	4.574	0.137	8	V8-7.N7.1	5.736	1.73	0.196
7	V7-21.N21.1	6.171	2.752	0.221	8	V8-7.N7.2	2.939	11.522	0.148
7	V7-21.N21.2	2.779	2.586	0.227	8	V8-14.N14.1	3.603	2.423	0.159
7					8	V8-14.N14.2	2.576	2.89	0.169
7					8	V8-21.N21.1	1.085	-4.445	0.087
7					8	V8-21.N21.2	1.537	5.713	0.113



## Statistik zu den Sequenzierdaten (nach der DADA2-Prozessierung)

Probenname	Input	Filtered	Percentage of input passed filter	Denoised	Merged	Percentage of input merged	Non-chimeric	Percentage of input non-chimeric
<b>Kontrollen</b>								
Leerprobe1	386025	357989	92.74	356919	340498	88.21	303527	78.63
Leerprobe2	354902	335949	94.66	334740	317807	89.55	291580	82.16
Leerprobe3	217262	183901	84.64	183677	176584	81.28	162805	74.93
Mock1	380468	356660	93.74	355419	332650	87.43	174096	45.76
Mock2	264263	247818	93.78	247129	236765	89.59	156922	59.38
Mock3	365405	343098	93.9	341413	315150	86.25	148235	40.57
FS1	615161	572568	93.08	564890	531567	86.41	518898	84.35
FS2	606922	569693	93.87	561916	523958	86.33	508588	83.8
FS3	247567	232801	94.04	229790	218162	88.12	217482	87.85
SS1	944884	884929	93.65	873139	811092	85.84	766708	81.14
SS2	370858	345915	93.27	340110	317848	85.71	311946	84.11
SS3	357662	334328	93.48	328617	306873	85.8	300626	84.05
HS1	451448	370341	82.03	364260	332451	73.64	329610	73.01
HS2	364004	342081	93.98	336508	315301	86.62	312724	85.91
HS3	320713	292353	91.16	286243	267222	83.32	265950	82.92
WS1	213483	199120	93.27	192971	149088	69.84	123954	58.06
WS2	504166	470193	93.26	455973	350904	69.6	275784	54.7
WS3	270830	254463	93.96	244910	191565	70.73	165397	61.07
<b>Versuchsreihe 1</b>								
V1.1.K1	57180	52659	92.09	50839	48694	85.16	47526	83.12
V1.1.K2	96822	62343	64.39	61090	59334	61.28	57716	59.61
V1.1.K3	73933	67590	91.42	65770	63609	86.04	62763	84.89
V1.2.K4	226680	48754	21.51	47386	45389	20.02	43078	19
V1.2.K5	190164	178097	93.65	175416	161961	85.17	99968	52.57
V1.2.K6	102450	95243	92.97	93312	88141	86.03	76059	74.24
V1.3.K7	87584	78124	89.2	76902	75055	85.69	71447	81.58
V1.3.K8	73177	67415	92.13	66606	65290	89.22	63904	87.33
V1.3.K9	192771	176139	91.37	172254	158890	82.42	105851	54.91
V1.4.K10	116592	107973	92.61	106107	99921	85.7	81173	69.62
V1.4.K11	81715	74980	91.76	74181	71986	88.09	67287	82.34
V1.4.K12	75103	69760	92.89	68465	66788	88.93	64082	85.33
V1.7.K13	76739	65595	85.48	64403	62498	81.44	59663	77.75
V1.7.K14	69243	63127	91.17	61588	58319	84.22	52066	75.19
V1.7.K15	87011	71457	82.12	70172	67997	78.15	63767	73.29
V1.14.K16	79402	72417	91.2	70990	69102	87.03	65478	82.46
V1.14.K17	64014	59165	92.43	57991	56342	88.02	52964	82.74
V1.14.K18	84221	77750	92.32	76772	75044	89.1	71296	84.65
V1.21.K19	140009	129171	92.26	126853	123120	87.94	117071	83.62
V1.21.K20	88384	80753	91.37	79819	78380	88.68	69723	78.89
V1.21.K21	85667	78688	91.85	77642	76037	88.76	69523	81.15
V1.1.N1	113838	105900	93.03	101948	96785	85.02	94388	82.91

V1.1.N2	56545	51054	90.29	48704	45635	80.71	43368	76.7
V1.7.N0	81406	76009	93.37	73293	70842	87.02	68998	84.76
V1.14.N0	85249	77324	90.7	76216	74093	86.91	73090	85.74
V1.21.N0	65052	58391	89.76	56207	52812	81.18	51775	79.59
V1.2.W4	79037	72069	91.18	69741	66079	83.61	61919	78.34
V1.2.W5	115750	104575	90.35	102348	98122	84.77	91589	79.13
V1.2.W6	85417	77573	90.82	74767	70077	82.04	62956	73.7
V1.3.W7	168140	155711	92.61	152368	146676	87.23	140712	83.69
V1.3.W8	81228	73475	90.46	71698	67871	83.56	65323	80.42
V1.3.W9	75250	65969	87.67	62841	58780	78.11	54928	72.99
V1.4.W10	67681	62316	92.07	60642	58339	86.2	56613	83.65
V1.4.W11	62413	57529	92.17	56375	54155	86.77	52643	84.35
V1.4.W12	70530	65288	92.57	63791	61782	87.6	60464	85.73
V1.7.W13	80517	73995	91.9	71071	65813	81.74	56953	70.73
V1.7.W14	71703	66034	92.09	64577	62389	87.01	60821	84.82
V1.7.W15	78837	71672	90.91	70017	67517	85.64	66293	84.09
V1.14.W16	54580	50559	92.63	49182	47377	86.8	46513	85.22
V1.14.W17	82928	74103	89.36	72076	68983	83.18	68051	82.06
V1.14.W18	60869	56731	93.2	55373	53011	87.09	52145	85.67
V1.21.W19	78445	73535	93.74	72399	70905	90.39	66433	84.69
V1.21.W20	64357	58738	91.27	57010	54174	84.18	50494	78.46
V1.21.W21	63808	59358	93.03	58512	57163	89.59	54633	85.62

**Versuchsreihe 2**

V2.1.K1	87527	66191	75.62	64702	62969	71.94	59345	67.8
V2.1.K2	78192	71693	91.69	70614	68468	87.56	66262	84.74
V2.1.K3	58460	54787	93.72	53582	51324	87.79	49161	84.09
V2.2.K4	63029	58300	92.5	57979	57045	90.51	55942	88.76
V2.2.K5	64886	59628	91.9	59169	57521	88.65	54299	83.68
V2.2.K6	73671	68107	92.45	67710	66542	90.32	65495	88.9
V2.3.K7	73124	68501	93.68	68193	66834	91.4	63909	87.4
V2.3.K8	90293	84159	93.21	83526	81845	90.64	78273	86.69
V2.3.K9	136043	125698	92.4	124986	119556	87.88	71515	52.57
V2.4.K10	76655	72425	94.48	72117	70667	92.19	66752	87.08
V2.4.K11	69579	63873	91.8	63465	62185	89.37	58314	83.81
V2.4.K12	79546	74326	93.44	73789	72100	90.64	66865	84.06
V2.7.K13	76332	71002	93.02	70567	68868	90.22	64742	84.82
V2.7.K14	79635	73708	92.56	73289	71716	90.06	67000	84.13
V2.7.K15	65720	60211	91.62	59750	58573	89.13	55956	85.14
V2.14.K16	48257	45112	93.48	44806	43690	90.54	41197	85.37
V2.14.K17	49629	46332	93.36	46001	44902	90.48	41371	83.36
V2.14.K18	54559	49629	90.96	49203	47934	87.86	45126	82.71
V2.21.K19	50527	46827	92.68	46287	44871	88.81	38609	76.41
V2.21.K20	32176	28756	89.37	28281	26585	82.62	21144	65.71
V2.21.K21	33692	30975	91.94	30458	29189	86.63	26763	79.43
V2.1.N1.1	115631	106549	92.15	104149	94337	81.58	61632	53.3
V2.1.N1.2	41026	37377	91.11	36445	34319	83.65	29637	72.24

V2.7.N7.1	94405	89701	95.02	89471	88830	94.09	86389	91.51
V2.14.N14.1	600725	108696	18.09	108493	108203	18.01	101796	16.95
V2.21.N21.1	34519	30540	88.47	30373	29849	86.47	28913	83.76
V2.2.W4	70565	60437	85.65	60030	58952	83.54	57572	81.59
V2.2.W5	71949	66666	92.66	66387	64779	90.03	58651	81.52
V2.2.W6	57913	53271	91.98	52920	51353	88.67	46761	80.74
V2.3.W7	90479	71094	78.58	70536	66757	73.78	52575	58.11
V2.3.W8	73907	67824	91.77	67257	65091	88.07	60424	81.76
V2.3.W9	74210	69314	93.4	69006	66727	89.92	58882	79.35
V2.4.W10	59076	51917	87.88	51331	49148	83.19	45279	76.65
V2.4.W11	85726	78434	91.49	77592	73638	85.9	56439	65.84
V2.4.W12	59253	54607	92.16	54232	52034	87.82	47689	80.48
V2.7.W13	63124	59002	93.47	58454	56268	89.14	52269	82.8
V2.7.W14	233808	84016	35.93	83292	81171	34.72	73966	31.64
V2.7.W15	71101	66273	93.21	65817	63544	89.37	56991	80.15
V2.14.W16	49339	33675	68.25	33378	32018	64.89	30006	60.82
V2.14.W17	30465	26818	88.03	26359	24781	81.34	22440	73.66
V2.14.W18	34666	32077	92.53	31699	30137	86.94	28553	82.37
V2.21.W19	35337	32753	92.69	32290	30538	86.42	27918	79.01
V2.21.W20	55673	50355	90.45	49340	46738	83.95	35689	64.1
V2.21.W21	35649	33495	93.96	33207	31794	89.19	29885	83.83

**Versuchsreihe 3**

V3.1.K1	205190	189513	92.36	186754	179144	87.31	169667	82.69
V3.1.K2	185371	155837	84.07	153174	145963	78.74	136168	73.46
V3.1.K3	206232	191149	92.69	188119	179804	87.19	172235	83.52
V3.2.K4	257757	227234	88.16	224805	215096	83.45	194029	75.28
V3.2.K5	157474	143788	91.31	140893	133078	84.51	127319	80.85
V3.2.K6	205606	188432	91.65	185901	177946	86.55	161726	78.66
V3.3.K7	282903	244584	86.46	241785	230497	81.48	208736	73.78
V3.3.K8	241694	211661	87.57	209869	202401	83.74	169928	70.31
V3.3.K9	1449515	252105	17.39	250253	243659	16.81	219865	15.17
V3.4.K10	485173	451404	93.04	448386	427184	88.05	232742	47.97
V3.4.K11	287674	265520	92.3	263354	253274	88.04	201402	70.01
V3.4.K12	347276	314673	90.61	311816	302217	87.03	279629	80.52
V3.7.K13	247134	215622	87.25	213605	208315	84.29	195541	79.12
V3.7.K14	275029	241502	87.81	238613	230305	83.74	201420	73.24
V3.7.K15	282499	232452	82.28	231191	225679	79.89	209738	74.24
V3.14.K16	296327	275813	93.08	274654	268529	90.62	248905	84
V3.14.K17	731712	673639	92.06	668189	633584	86.59	330641	45.19
V3.14.K18	214307	192540	89.84	190634	185244	86.44	172946	80.7
V3.21.K19	230908	201891	87.43	200747	196195	84.97	181570	78.63
V3.21.K20	206328	187388	90.82	185951	181455	87.94	168163	81.5
V3.21.K21	262966	239858	91.21	236883	224912	85.53	178733	67.97
V3.1.N1.1	209648	174774	83.37	172323	166656	79.49	156419	74.61
V3.1.N1.2	162785	149490	91.83	147110	142093	87.29	135820	83.44
V3.7.N7.1	189393	164538	86.88	161041	149686	79.03	122110	64.47

V3.7.N7.2	132091	110093	83.35	109282	107012	81.01	106336	80.5
V3.14.N14.1	176346	159326	90.35	156284	147477	83.63	141835	80.43
V3.14.N14.2	186009	165439	88.94	162997	155350	83.52	146812	78.93
V3.21.N21.1	169363	151696	89.57	149303	142097	83.9	128710	76
V3.21.N21.2	310168	270655	87.26	267586	257420	82.99	240757	77.62
<b>Versuchsreihe 4</b>								
V4.1.K1	286631	248888	86.83	247271	241228	84.16	229381	80.03
V4.1.K2	285285	264236	92.62	262473	254941	89.36	230579	80.82
V4.1.K3	328803	297768	90.56	294906	284745	86.6	269797	82.05
V4.2.K4	277825	252545	90.9	250632	243109	87.5	223565	80.47
V4.2.K5	277345	255145	92	253273	246872	89.01	222986	80.4
V4.2.K6	237591	216845	91.27	214911	208747	87.86	194561	81.89
V4.3.K7	222196	205814	92.63	204952	200331	90.16	180157	81.08
V4.3.K8	292394	271129	92.73	269640	262857	89.9	221587	75.78
V4.3.K9	264559	244251	92.32	243181	237139	89.64	208366	78.76
V4.4.K10	329791	299808	90.91	298069	290390	88.05	258262	78.31
V4.4.K11	312176	285626	91.5	284916	278752	89.29	273498	87.61
V4.4.K12	276149	251340	91.02	250175	244208	88.43	216883	78.54
V4.7.K13	378234	345698	91.4	342743	332335	87.86	323366	85.49
V4.7.K14	257172	234356	91.13	232746	228343	88.79	207654	80.75
V4.7.K15	276216	253704	91.85	252950	248356	89.91	217543	78.76
V4.14.K16	419984	381716	90.89	379042	361217	86.01	241648	57.54
V4.14.K17	271436	248815	91.67	247654	242593	89.37	217502	80.13
V4.14.K18	423548	252535	59.62	251301	246901	58.29	228454	53.94
V4.21.K19	270995	251199	92.7	250477	246831	91.08	228323	84.25
V4.21.K20	273059	248113	90.86	247285	245280	89.83	234478	85.87
V4.21.K21	325449	206624	63.49	205582	203164	62.43	194187	59.67
V4.1.N1.1	101208	90017	88.94	89558	88538	87.48	85829	84.8
V4.1.N1.2	92273	83562	90.56	83082	81702	88.54	81316	88.13
V4.7.N7.1	253737	226594	89.3	225949	222429	87.66	219547	86.53
V4.7.N7.2	269881	238860	88.51	237967	236136	87.5	234653	86.95
V4.14.N14.1	243166	219415	90.23	218691	215806	88.75	196797	80.93
V4.14.N14.2	149111	75305	50.5	74548	72112	48.36	64005	42.92
V4.21.N21.1	291432	249267	85.53	248243	244552	83.91	204853	70.29
V4.21.N21.2	305024	273140	89.55	272599	269513	88.36	267744	87.78
<b>Versuchsreihe 5</b>								
V5.1.K1	228734	206996	90.5	205350	199599	87.26	174687	76.37
V5.1.K2	284360	254861	89.63	252128	243682	85.69	220824	77.66
V5.1.K3	408175	370648	90.81	366835	352237	86.3	224277	54.95
V5.2.K4	256513	217738	84.88	216598	212963	83.02	206561	80.53
V5.2.K5	302633	258775	85.51	257043	251316	83.04	227684	75.23
V5.2.K6	241724	211088	87.33	209718	205996	85.22	195036	80.69
V5.3.K7	252788	228478	90.38	227632	224170	88.68	206682	81.76
V5.3.K8	242122	209742	86.63	208792	205269	84.78	192718	79.6
V5.3.K9	279378	246629	88.28	245240	241066	86.29	225440	80.69
V5.4.K10	266881	242700	90.94	241219	235223	88.14	208707	78.2

V5.4.K11	338751	230615	68.08	228566	222965	65.82	195256	57.64
V5.4.K12	264410	223370	84.48	221981	215653	81.56	181823	68.77
V5.7.K13	186985	172606	92.31	171495	165819	88.68	142175	76.04
V5.7.K14	301008	232009	77.08	230975	226504	75.25	205420	68.24
V5.7.K15	248661	225062	90.51	223336	217230	87.36	187379	75.36
V5.14.K16	262106	233432	89.06	232377	228352	87.12	210300	80.23
V5.14.K17	637220	217520	34.14	216436	213095	33.44	191585	30.07
V5.14.K18	241365	211250	87.52	209825	206217	85.44	180931	74.96
V5.21.K19	297065	268404	90.35	267128	263450	88.68	235545	79.29
V5.21.K20	257978	230815	89.47	229493	225223	87.3	199965	77.51
V5.21.K21	258191	228640	88.55	227092	221383	85.74	190166	73.65
V5.21.K22	297660	264094	88.72	262767	257059	86.36	211267	70.98
V5.21.K23	375650	226873	60.39	225579	220996	58.83	189332	50.4
V5.1.N1.1	277742	249663	89.89	245045	236196	85.04	214939	77.39
V5.1.N1.2	312946	258069	82.46	252954	241186	77.07	200415	64.04
V5.7.N7.1	226566	203704	89.91	200756	194351	85.78	179398	79.18
V5.7.N7.2	353208	306572	86.8	301688	286247	81.04	262758	74.39
V5.14.N14.1	421176	374117	88.83	369584	358069	85.02	326624	77.55
V5.14.N14.2	253757	226117	89.11	222919	216664	85.38	205235	80.88
V5.21.N21.1	229674	201412	87.69	199276	195007	84.91	183689	79.98
V5.21.N21.2	335601	288759	86.04	285407	278818	83.08	261766	78

**Versuchsreihe 6**

V6.1.K1	376353	353122	93.83	348571	134546633	35750.12	294140	78.16
V6.1.K2	272195	196474	72.18	193447	180755	66.41	155443	57.11
V6.1.K3	537733	503938	93.72	497432	465207	86.51	366422	68.14
V6.2.K4	266284	251232	94.35	249684	239590	89.98	191862	72.05
V6.2.K5	408031	373076	91.43	370665	351087	86.04	318791	78.13
V6.2.K6	721629	669539	92.78	667580	633041	87.72	511396	70.87
V6.3.K7	653983	602157	92.08	600827	575114	87.94	441499	67.51
V6.3.K8	485093	451857	93.15	450147	435364	89.75	347886	71.72
V6.3.K9	549749	519471	94.49	517059	495592	90.15	354676	64.52
V6.4.K10	282091	265409	94.09	264691	258038	91.47	228860	81.13
V6.4.K11	783944	735565	93.83	732618	701662	89.5	572511	73.03
V6.4.K12	493217	448929	91.02	447664	431197	87.43	313534	63.57
V6.7.K13	488831	460226	94.15	458381	439079	89.82	390775	79.94
V6.7.K14	616742	579830	94.02	578756	553090	89.68	489769	79.41
V6.7.K15	389019	365888	94.05	365298	356869	91.74	281908	72.47
V6.14.K16	733319	687146	93.7	684219	659247	89.9	576150	78.57
V6.14.K17	835667	787261	94.21	785083	762831	91.28	637532	76.29
V6.14.K18	557757	524808	94.09	522857	504698	90.49	416517	74.68
V6.21.K19	406006	380898	93.82	379475	368753	90.82	316261	77.9
V6.21.K20	787898	740019	93.92	737699	712481	90.43	520676	66.08
V6.21.K21	684107	640706	93.66	639120	617618	90.28	503106	73.54
V6.1.N1.1	1166310	751199	64.41	747051	686184	58.83	563534	48.32
V6.1.N1.2	531066	428678	80.72	426823	409100	77.03	350934	66.08
V6.7.N7.1	745687	552560	74.1	545215	510416	68.45	421557	56.53

V6.7.N7.2	1359001	1014251	74.63	1008143	941593	69.29	815225	59.99
V6.14.N14.1	452028	399542	88.39	398303	381927	84.49	335627	74.25
V6.14.N14.2	717549	601048	83.76	598821	573732	79.96	496575	69.2
V6.21.N21.1	375544	281164	74.87	278934	251968	67.09	221291	58.93
V6.21.N21.2	645018	505234	78.33	502144	473005	73.33	409493	63.49
<b>Versuchsreihe 7</b>								
V7.2.K4	381369	356676	93.53	351850	324564	85.1	252540	66.22
V7.2.K5	338513	314897	93.02	310445	290957	85.95	247949	73.25
V7.2.K6	364158	340830	93.59	335119	305090	83.78	250191	68.7
V7.3.K7	652615	612229	93.81	609297	575940	88.25	458995	70.33
V7.3.K8	272096	245103	90.08	240763	217882	80.08	176603	64.9
V7.3.K9	307783	290401	94.35	287516	271277	88.14	232179	75.44
V7.4.K10	434262	407487	93.83	405617	384904	88.63	319565	73.59
V7.4.K11	328631	307490	93.57	306510	293606	89.34	222371	67.67
V7.4.K12	733748	692410	94.37	688696	653804	89.1	478077	65.16
V7.7.K13	359239	337334	93.9	335537	321938	89.62	255344	71.08
V7.7.K14	290604	271345	93.37	269182	250712	86.27	154743	53.25
V7.7.K15	445099	420961	94.58	418976	400647	90.01	301983	67.85
V7.14.K16	582881	534395	91.68	532039	492918	84.57	273065	46.85
V7.14.K17	373831	351520	94.03	349009	326912	87.45	214231	57.31
V7.14.K18	155777	88796	57	88109	76440	49.07	50301	32.29
V7.21.K19	554841	509573	91.84	507420	481037	86.7	362096	65.26
V7.21.K20	312346	291745	93.4	289301	266600	85.35	165325	52.93
V7.21.K21	420397	395974	94.19	394048	373747	88.9	253522	60.31
V7.1.N1.2	1665220	1145141	68.77	1138551	1048337	62.95	856626	51.44
V7.1.N1.3	816888	636208	77.88	633774	603752	73.91	526154	64.41
V7.7.N7.1	628328	579001	92.15	573949	542510	86.34	457007	72.73
V7.7.N7.2	794534	685678	86.3	680789	642509	80.87	553277	69.64
V7.14.N14.1	451967	410846	90.9	406374	382016	84.52	325978	72.12
V7.14.N14.2	808426	706530	87.4	700888	660391	81.69	559913	69.26
V7.21.N21.1	720072	660130	91.68	650061	603335	83.79	494526	68.68
V7.21.N21.2	611053	566641	92.73	561862	537848	88.02	478639	78.33
<b>Versuchsreihe 8</b>								
V8.1.K1	574815	535034	93.08	529019	490611	85.35	356499	62.02
V8.1.K2	695491	631039	90.73	625173	591946	85.11	504385	72.52
V8.1.K3	625967	566619	90.52	561745	520493	83.15	441362	70.51
V8.2.K4	592185	560347	94.62	553305	519800	87.78	449151	75.85
V8.2.K5	416471	393498	94.48	390723	371224	89.14	284842	68.39
V8.2.K6	779773	729360	93.53	721313	671021	86.05	591452	75.85
V8.3.K7	365284	345816	94.67	342894	326710	89.44	315086	86.26
V8.3.K8	401090	372822	92.95	369667	349545	87.15	311470	77.66
V8.3.K9	885846	842285	95.08	834451	777715	87.79	712159	80.39
V8.4.K10	456124	430281	94.33	428682	402965	88.35	384951	84.4
V8.4.K11	473917	447286	94.38	443506	414548	87.47	408295	86.15
V8.4.K12	622383	590912	94.94	588327	547370	87.95	540517	86.85
V8.7.K13	197873	182526	92.24	181883	170270	86.05	168469	85.14

V8.7.K14	331446	312682	94.34	311639	288472	87.03	284998	85.99
V8.7.K15	356932	323794	90.72	323169	295655	82.83	292366	81.91
V8.14.K16	388183	365581	94.18	361398	334448	86.16	329993	85.01
V8.14.K17	546997	516185	94.37	511257	467104	85.39	456669	83.49
V8.14.K18	224595	210260	93.62	209657	134417582	59848.88	196070	87.3
V8.21.K19	242051	216319	89.37	215244	201619	83.3	199387	82.37
V8.21.K20	240113	220474	91.82	218606	205120	85.43	201883	84.08
V8.21.K21	635384	601433	94.66	599312	557770	87.78	534833	84.17
V8.1.N1.1	746027	676556	90.69	665734	590359	79.13	509036	68.23
V8.1.N1.3	696496	652844	93.73	642416	573302	82.31	478219	68.66
V8.7.N7.1	1133356	967324	85.35	964718	925437	81.65	799982	70.59
V8.7.N7.2	1673566	1312954	78.45	1309338	1240892	74.15	1074468	64.2
V8.14.N14.1	1323145	1163409	87.93	1152874	1061131	80.2	969190	73.25
V8.14.N14.2	1341035	1192310	88.91	1179969	1048921	78.22	823733	61.43
V8.21.N21.1	863909	678252	78.51	675589	646170	74.8	554238	64.15
V8.21.N21.2	969668	720175	74.27	717350	675522	69.67	571980	58.99